MARCH 1965 / 50c

AIR FORCE

and **SPACE DIGEST**

The Magazine of Aerospace Power / *Published by the Air Force Association*

A Special Report

HOW SERIOUS ARE WE ABOUT V/STOL

ALSO IN THIS ISSUE . . .

- The NATO Defense College in Paris
- Life in a Remote AC&W Site in Alaska
- Photo Essay on the Aerospace Medical Division

PLUS

"THE DETERRENT SYSTEM" from the important new book by Gen. Thomas S. Power, USAF (Ret.)

Radar for the big ones. The big military transports and Sperry's series APN-59 navigation and weather radars make a winning combination. Sperry's versatile APN-59B radars point the way for such giants as the Lockheed C-130, Douglas C-133, Boeing KC-135 and the new Lockheed C-141. And the next heavy logistics support transport requirement? □ Sperry airborne radars will give the kind of all-weather dependability and precision that's essential to weather avoidance, paradrops, beacon operation, aerial refueling, long-range and terminal navigation. Equally important, Sperry radar makes spares and support sense. Those who operate and maintain the big ones *know* Sperry, and Sperry understands *their* needs, in terms of operation, maintenance, and logistics support. **RADIATION DIVISION, Sperry Gyroscope Co., Great Neck, New York.**

SPERRY
DIVISION OF
SPERRY RAND
CORPORATION

CO-PILOT

Today's Minuteman is more than a super-reliable missile.

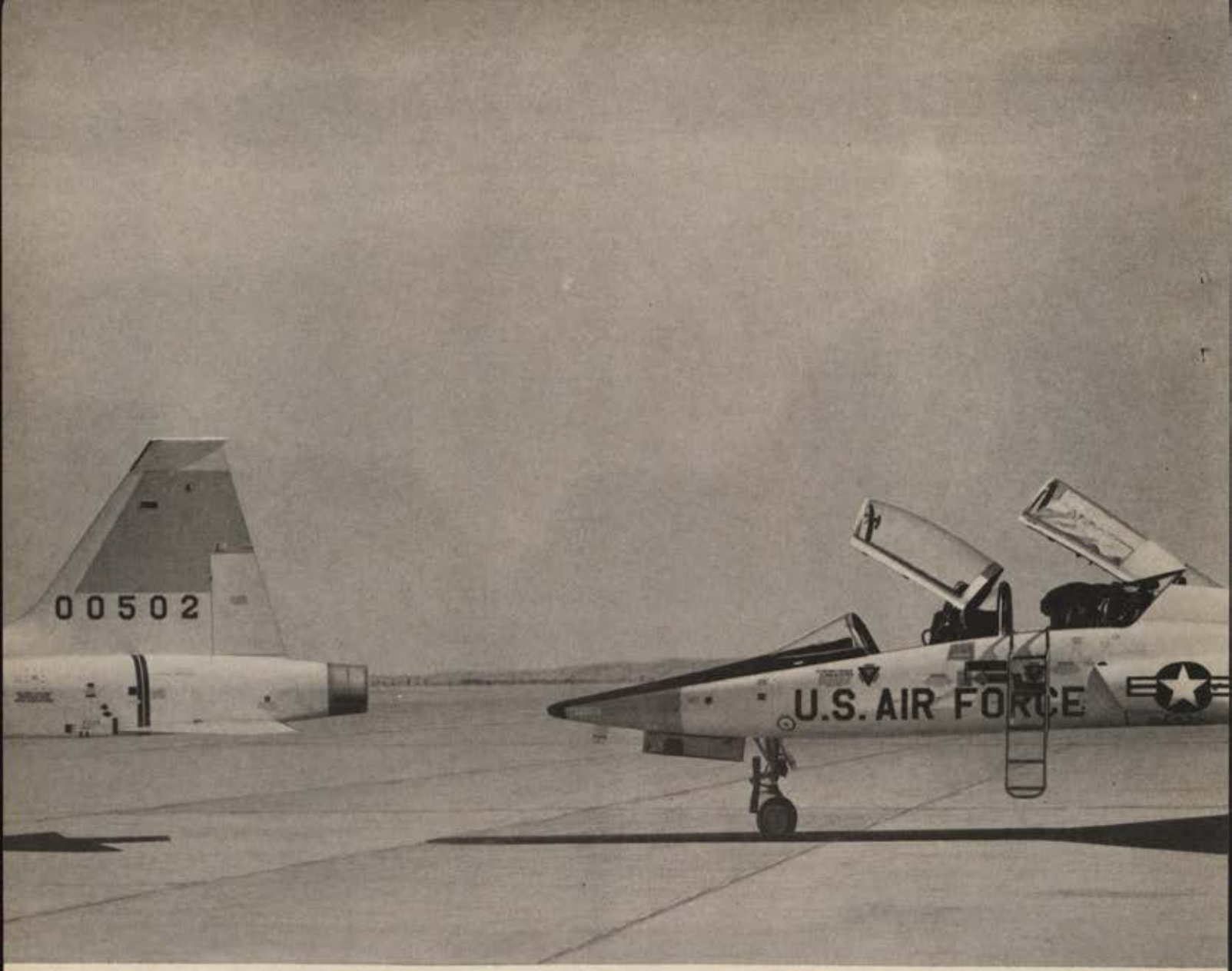
It is a spearhead of electronics progress—technology that is making it a co-pilot by proxy in low-level supersonic aircraft.

It is the forerunner of microelectronic low-level penetration systems by NAA/Autonetics that spot and evade obstacles with unprecedented accuracy. These new NAA/Autonetics systems are based on proven Minuteman techniques and systems management experience.

Autonetics built the fully-integrated microelectronics systems in Minuteman II; was the first to apply microelectronics to production-line systems. Its achievements in this field are setting a whole new standard of reliability in the electronics industry.

For more information about Autonetics total systems capability in meeting the electronics needs of the future, please write: Director of Marketing, NAA/Autonetics Division, 3370 Miraloma Avenue, Anaheim, Calif.

North American Aviation Autonetics Division



More than 500 Northrop T-38's have

been delivered to the U.S. Air Force.

The T-38 supersonic trainer first flew in April 1959. For nearly four years the T-38 has been the U.S. Air Force's basic supersonic undergraduate pilot trainer.

The T-38 has become USAF's versatile workhorse. It is used to train instructor pilots. It is the official space-flight readiness trainer for the astronauts of the National Aeronautics and Space Administration. It is used for advanced training and flight proficiency at the Aerospace Pilots' Research School, Edwards Air Force Base, California.

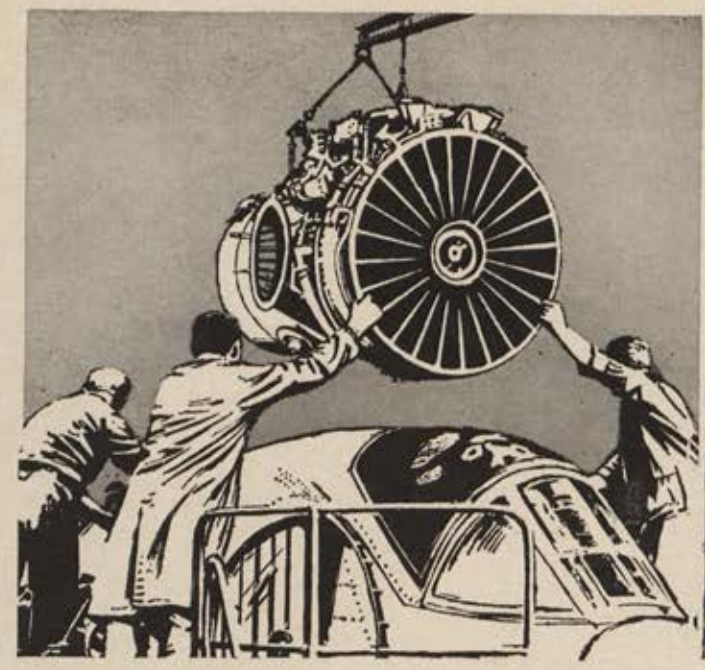
Because of the T-38's acceleration and maneuverability it is the chase airplane for the X-15 rocket research craft, and in the XB-70 and C-141 flight test programs.

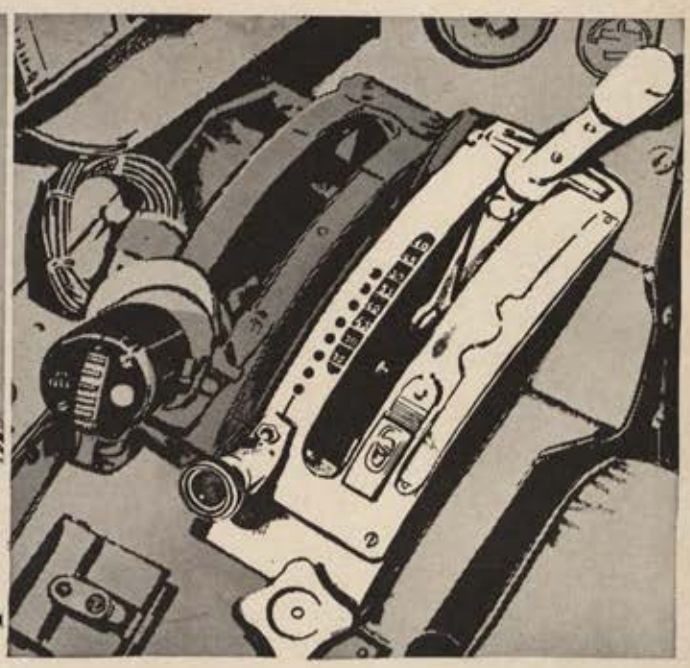
The T-38 was the first supersonic aircraft to complete its USAF flight test program without a single major accident. It is still the safest supersonic airplane in the USAF inventory, with an average of only 3.6 major accidents per 100,000 flying hours.

The T-38 is also the most reliable supersonic aircraft in service with USAF. The T-38's now in service in the undergraduate pilot training program have averaged 45.9 hours of utilization per month for an entire year, with only 11.8 man/hours of maintenance per flight hour—by far the lowest maintenance index of any supersonic aircraft.

All in all, the Northrop T-38 has proved itself to be a most remarkable airplane.

NORTHROP T-38





Simplified V/STOL installation and control

with Bristol Siddeley vectored thrust engines

Bristol Siddeley vectored thrust engines provide the simplest and most practical power systems for all V/STOL aircraft. The total thrust can be directed vertically for VTOL, at any required intermediate angle for STOL or in-flight maneuvers, and horizontally for normal flight and for braking.

Single Engined V/STOL Aircraft. A high-performance V/STOL aircraft, requiring a very high thrust in normal flight, can be powered by a single engine and thus benefit from the resulting lower manufacturing cost, simplified maintenance and higher rate of serviceability.

Forward Facing Intake. Vectored thrust engines have air intakes facing forward in the orthodox way. They therefore avoid the problems and complications inevitable when separate lift and propulsion engines are used.

Fixed Center of Thrust. Whatever the angle of the nozzles, the resultant thrust always passes through the same point. This can be arranged to coincide with the aircraft center of gravity.

Simplicity of Control. Control of the engine thrust direction can be effected by a single lever control. This facilitates transitions and in-flight control and simplifies pilot training.

The Bristol Siddeley Pegasus, powerplant of the Hawker Siddeley P 1127, has been flying since October 1960 and has effectively demonstrated the advantages of vectored thrust engines over all other forms of V/STOL power.

Bristol Siddeley Engines Limited. Executive Office: Mercury House, 195 Knightsbridge, London SW7, England.

BRISTOL SIDDELEY
SUPPLY THE POWER

COVENTRY, NORTH LONDON AND BRISTOL

JAMES H. STRAUBEL
Publisher

JOHN F. LOOSBROCK
Editor and Assistant Publisher

EDITORIAL STAFF

RICHARD M. SKINNER	*Managing Editor*
CLAUDE WITZE	*Senior Editor*
WILLIAM LEAVITT	*Associate Editor*
ALLAN R. SCHOLIN	*Associate Editor*
J. S. BUTZ, JR.	*Technical Editor*
LAURENCE W. ZOELLER	*Ass't Managing Editor*
PHILIP E. KROMAS	*Art Director*
NELLIE M. LAW	*Editorial Assistant*
PEGGY M. CROWL	*Editorial Assistant*
JESSICA S. BYCZYNSKI	*Editorial Assistant*
JUDITH DAWSON	*Editorial Assistant*
JAQUELINE A. DAVIS	*Research Assistant*
GUS DUDA	*AFA Affairs*
DON STEELE	*AFA Affairs*
JACKSON V. RAMBEAU	*Military and Industrial Relations*

STEFAN GEISENHEYNER — Editor for Europe
6200 Wiesbaden, Germany
Sonnenberger Strasse 15

ADVERTISING STAFF

SANFORD A. WOLF	*Director of Marketing*
JANET LAHEY	*Ad Production Manager*
ARLINE RUDESKI	*Promotion Manager*

ADVERTISING OFFICES—EASTERN: Sanford A. Wolf, Director of Marketing; Douglas Andrews, Mgr.; John W. Robinson, Mgr., 880 Third Ave., New York, N. Y. 10022 (PLaza 2-0235). **WESTERN:** Harold L. Keeler, West Coast Manager; William H. McQuinn, Mgr., 10000 Santa Monica Blvd., Suite 309, Los Angeles 67, Calif. (878-1530). **MIDWEST:** James G. Kane, Mgr., 3200 Dempster St., Des Plaines, Ill. (296-5571). **SAN FRANCISCO:** William Coughlin, Mgr., 444 Market St., San Francisco, Calif. 94111 (GArfield 1-0151).

BPA **AIR FORCE Magazine and SPACE DIGEST** are published monthly by the Air Force Association, 1750 Pennsylvania Ave., N.W., Washington, D.C. 20006, 298-9123.

SNAP

PRINTED in USA, by McCall Corporation, Dayton, Ohio. Second-class postage paid at Dayton, Ohio. Composition by Sterling Graphic Arts, New York, N.Y. Photoengravings by Southern & Lanman, Inc., Washington, D.C.

ADVERTISING correspondence, plates, contracts, and related matter should be addressed to **AIR FORCE/SPACE DIGEST**, Advertising Hq., 880 Third Ave., New York, N. Y. 10022.

EDITORIAL correspondence and subscriptions should be addressed to Air Force Association, 1750 Pennsylvania Ave., N.W., Washington, D.C. 20006. Publisher assumes no responsibility for unsolicited material.

CHANGE OF ADDRESS: Send old and new addresses (include mailing label from this magazine), with ZIP code number, to Air Force Association, 1750 Pennsylvania Ave., N.W., Washington, D.C. 20006. Allow six weeks for change of address to become effective.

MEMBERSHIP RATE: $6 per year (includes $5 for one-year subscription to AIR FORCE/SPACE DIGEST). Subscription rate—$6 per year, $7 foreign. Single copy 50¢. Special issues (April and September) $1 each.

UNDELIVERED COPIES: Send notice on Form 3579 to Air Force Association, 1750 Pennsylvania Ave., N.W., Washington, D.C. 20006.

AIR FORCE
and SPACE DIGEST

The Magazine of Aerospace Power
Published by the Air Force Association

VOLUME 48, NUMBER 3 — **MARCH 1965**

To "Rat" Or Not to "Rat" / BY JOHN F. LOOSBROCK — 6
Cheating is morally wrong, no matter where it is done or by whom, and the Academy affair cannot be considered apart from this basic premise.

How Serious Are We About V/STOL? / BY J. S. BUTZ, JR. — 25
A congressional committee has issued a report advocating expansion of the nation's V/STOL program. Problems remain, but effective V/STOL aircraft could revolutionize military mobility.

Molding International Leaders / BY COL. RICHARD J. STILLMAN, USA — 30
Personnel destined for key positions in NATO attend a unique school in Paris, the NATO Defense College, where they acquire the special knowledge and broadened viewpoint necessary to do their jobs.

The Battle of Long My: Air Support in Action / BY KENNETH SAMS — 34
This account of effective air action against the Viet Cong in one long day of fighting may well become a model for future operations, in view of the recently increased tempo of the war in Vietnam.

Remote Site Life / BY HOWARD BRODIE — 38
An artist-writer visits an AC&W site off the coast of Alaska to draw and write his impressions of life on a cold and lonely Arctic island.

SPACE DIGEST

Criteria for a Rational Space Program / BY J. R. DEMPSEY — 43
Looking at our space program for what it is—a valuable research program with unforeseeable benefits—we should take the long-range view and plan orderly development and exploration.

USAF's Wide-Ranging Aerospace Medical Division
A SPACE DIGEST PHOTO REPORT — 48
Exploring the frontiers of space medicine, training flight surgeons, ensuring survival in extreme environments, preparing for MOL—these are just some of AMD's daily jobs.

Higher Education for the Space Age / BY LOGAN WILSON — 52
Tomorrow's colleges will be more than larger versions of today's, swollen by the population explosion. Their roles and student bodies will be broader and more varied.

Speaking of Space / BY WILLIAM LEAVITT — 58
The long hiatus in US manned spaceflight will end with the first Gemini flight. Now is a good time to look back over events since the first Mercury Astronauts were named.

The Nature of the Deterrent System
BY GEN. THOMAS S. POWER, USAF (RET.) — 64
In an important excerpt from his new book, the recently retired commander of the Strategic Air Command warns against making drastic changes in what he feels is a sound system.

DEPARTMENTS

Airmail	11	The Bulletin Board	74
Airpower in the News	12	AFA News	87
Aerospace World	16	There I Was	89
Index to Advertisers	20	This Is AFA	92

To 'Rat' Or Not to 'Rat'

By John F. Loosbrock

EDITOR, AIR FORCE/SPACE DIGEST

IT IS difficult to be impersonal and objective about the cheating affair at the Air Force Academy. The personal ties are too strong, the involvement too intimate, the interest too deep. It is like a bad dream, and we wish it were only that.

But the nightmare is reality, as so many nightmares are these days, and adjusting to reality is the hallmark of maturity for institutions as well as men.

It is too early to come to any final judgments on the entire issue. Only the bare bones of the facts are known at this writing. But one point, we think, has been lost sight of in the public discussion of the honor code and its so-called obligation to "rat" on one's schoolmates. This aspect of the case can, in our view, be spoken to now.

To begin with, there is an essential matter of morality involved. It has nothing to do with whether or not the Academy has an honor code, nothing to do with the fact that the Academy is training young men for commissioned careers in the Air Force, nothing to do with whether the Academy is a good school or a poor one.

Cheating is intrinsically evil, as is lying, or stealing, or murder. It is wrong in and of itself. It is wrong whether it is done at Colorado Springs, or Annapolis, or West Point, or Harvard. It is wrong whether there is an honor system or one proctor per student. It cannot be more wrong in one school than in another, nor can it be less wrong under one set of circumstances than another. It is not a matter for legislation as are such extrinsics as curfew, study hours, bed-making, shoe-polishing, or the squareness of the hat on parade. Cheating is not a prank. It is a serious and substantial matter of morality.

The very wording of the honor code sets its boundaries. The code says "I will not lie, cheat, or steal. And I will not tolerate those who do." It does not say "I will not stay out after curfew." Or "I will not forget to polish my shoes." The code is a basic moral document and must be considered as such.

By the same token, if the code is to be meaningful, it must be a tool for self-discipline by the Cadets themselves and not adopted as a regulatory device by the Academy administration. These two factors, in our judgment, are basic. First, the code must apply to substantive matters, not to externals. Second, it must be administered by the Cadets themselves, as it is at the Academy. Otherwise it loses purpose.

It is in this context that the obligation to report violations of the code must be viewed. Let us cite a homely example from everyday life. The regulation of parking on a city street is essentially a regulatory matter. There is nothing intrinsically evil about parking in a "no parking" zone, and hence there is no moral obligation for a citizen to report it to a policeman. There is, on the other hand, a real moral obligation to "tattle" on a hit-and-run driver. One is a matter of regulation. The other is a matter of substance.

The fear of being known as a "tattler," a "snitch," or a "rat" works against society, not for it. It is "thieves' honor," which protects the thief against the honest man. *Omerta*, or the code of silence, has been the basic strength of the Mafia in its war upon society. And there is the classic case of Kitty Genovese, stabbed to death on her own doorstep in New York not many months ago, for want of a telephone call to the police by her neighbors who saw but stood silent.

At this writing, we are assured that every Cadet at the Academy who has resigned in connection with the cheating has been directly involved. No one has resigned solely because he knew and did not tell. These latter cases are to come before the Cadet honor committee, and the word we get is that the Cadets are in a mood to deal harshly with them. Circumstances vary and there are degrees of punishment which can take this variation into consideration.

Meanwhile, the Academy will close ranks, not merely for survival but for improvement. Secretary Zuckert moved wisely and swiftly in this direction with his appointment of a select advisory committee to review Academy programs. The committee is an able one, headed by former Chief of Staff Gen. Thomas D. White and includes Dean Hardy Dillard of the University of Virginia Law School; Charles B. Thornton, President of Litton Industries; Dr. Robert B. Stearns, former President of the University of Colorado; and Lt. Gen. Joseph J. Nazzaro, Vice Commander in Chief of SAC.

The committee's charter is broad. In his letter to General White, Mr. Zuckert asked that the following questions be explored:

Are the Academy's high standards of moral and ethical conduct being emphasized in sufficient depth in the Cadet's life?

Do all Academy officials do their utmost to develop the moral and ethical strength of Cadets?

Is the honor system, in fact, generally accepted by the Cadets as a way of life? Is the honor code unreasonable or unrealistic, in whole or in part?

Are the pressures on the individual generated by the curriculum, extracurricular activities, military responsibilities, and the honor system too great?

What is the proper role of intercollegiate athletics in the Academy mission, including the effect of recruiting practices, scheduling of activities, and the treatment of the players themselves?

The committee is asked to "proceed with all prudent speed." It can make an important contribution to the Air Force and to the nation. We are sure it will.—END

PRODUCTS and SERVICES for the era of SPEED and SPACE...

The creative ability, engineering skill, experience and production capability of Computing Devices has made the company a leader in the following products and services.

AIR NAVIGATION SYSTEMS
PHI — Position and Homing Indicator
ANTAC — Air Navigation and Tactical Control System
GAINS — Global Airborne Integrated Navigation System
SKYLINE — Across Track Along Track Air Navigation Computer
ADC — Airborne Digital Computers

PHOTO SYSTEMS
Photo Reconnaissance Systems
Special Purpose Photographic Systems
Airborne Optical Systems

DISPLAYS
Tactical Moving Map Display
Head-up Display Systems
Tactical Display Systems

AEROPHYSICS RESEARCH
Hypervelocity Impact
High "G" Electronics

SYSTEMS DESIGN, DEVELOPMENT AND MANAGEMENT
Advanced Systems Engineering
Product Design and Development
Avionics Systems Management
Undersea Warfare Studies
Oceanographic Surveys

DATA ANALYSIS AND REDUCTION
Data Processing Techniques
Data Handling Equipment
Special Purpose Programming
Special Purpose Computer Design

MANUFACTURING
Precision production to Military Standards
Government Approved Quality Control
Environmental Test Facilities

SERVICES
Technical Assistance and Supervision
Field Engineering Services
Repair and Overhaul
Technical Manuals

Enquiries sent to the address below will be forwarded to our representative in your area.

Computing Devices
OF CANADA LIMITED
P.O. BOX 508 • OTTAWA 4 • CANADA
AN AFFILIATE OF THE BENDIX CORPORATION

C64-19

Because time is priceless, they use the JetStar.

The men in both groups must face up to the same dilemma. The greater the responsibility, the heavier the workload. The more there is to do, the less time to do it. Whether business or military executive, every man often is needed in several widely separated places at one time.

The answer forward-looking industrial firms are finding makes just as much sense for the military: the four-jet Lockheed C-140. It won't create a 25-hour day, but it will get you there in *half the time* an outmoded piston-engine transport takes, or *one-quarter less time* than a late-model prop-driven transport.

And the C-140 will do this not for a mere handful of busy men, but for as many as nineteen (yes, 19) of them.

Jet speed is only one way the

Why shouldn't they, for the same reason?

C-140 pays for itself. It's a versatile *utility* workhorse with room in its big cabin for 17 passengers, a hefty shipment of high-priority cargo, or a combination passenger-cargo set-up. Yet big as it is, fast as it is, the C-140 costs less to operate per mile than most twin- or four-engine propeller planes. It's economy-proven by experience, with over 26 million JetStar miles in the last four years.

Should the military services put more C-140s into action? Industry is doing it. Is the services' need to save time *less* urgent?

Lockheed-Georgia Company, Marietta, Georgia: A Division of Lockheed Aircraft Corporation.

LOCKHEED

C-140: the 19-place/4-engine utility jet

WHY WILL THE APRIL "MISSILE AND SPACE ALMANAC" ISSUE PRINT 110,000 COPIES?

Because year after year, from ten to fifteen thousand extra copies of AIR FORCE/SPACE DIGEST'S **"Missile and Space Almanac"** issue are bought by aerospace industry, the Air Force, and NASA for year-long reference use.

Added to the regular AIR FORCE/SPACE DIGEST BPA-audited circulation of 93,900, total circulation of this unique issue will be 110,000 . . . far larger circulation than that of any other single issue of any other aerospace publication . . . circulation that will include just about every key management man running the giant $3.5 billion USAF missile and space program in FY 1965 as well as top NASA executives.

Despite this bonus circulation and year-long reference life, regular advertising rates will apply.

Time is very short. For additional market data, circulation information, readership surveys, rates, etc., call or write advertising headquarters, AIR FORCE/SPACE DIGEST, 880 Third Avenue, New York, N.Y. 10022 (Tel. 752-0235) or the nearest regional office at Los Angeles (Tel. 878-1530), Des Plaines, Ill. (Tel. 296-5571) or San Francisco (Tel. 421-0151).

AIRMAIL

Foundation for Updating

Gentlemen: Over the years, I have come to know many of the people who have built AFA and its splendid publication. Being principally involved in the personnel and training area, I haven't had the opportunity to know [your Technical Editor, J. S. Butz, Jr.,] so I will violate my usual custom [of writing] a fan letter.

Doing a reasonable job with the human element of the Air Force takes enough energy to deprive many of us of the broad comprehension of the hardware side of the house that we need to make sense in our decisions. As a one-time maintenance man, I read everything I can get my hands on to try to keep abreast. Usually this is a bits-and-pieces approach, and, without a great deal of application, some of it is over my P-12, P-26 comprehension.

I have found Mr. Butz's articles to be unique and invaluable professional reading, since he covers concept, background, trend, and the new in a single and all-inclusive article. The end result is retention of the salient points and a solid foundation on which to explore further.

I realize that sole-source procurement is sometimes frowned upon, even in education. However, I hope that others have already told you what a first-class sole source you have become for stimulation in technical updating.

Maj. Gen. Lloyd P. Hopwood
Commander
Hq. Amarillo Technical Training Center (ATC)
Amarillo AFB, Tex.

Service Appreciated

Gentlemen: I want to take this opportunity to thank you sincerely for the excellent service you are performing for the Reservists of the Air Force.

Also, I want to say that your magazine is one of the finest I have ever read. . . .

Maj. Eugene Mercuri
Santa Clara, Calif.

Fatal Togetherness

Gentlemen: Some years ago Air Force Magazine printed a letter from an irate reader who was appalled by a photo you published. The picture showed Fifth Air Force F-86 Sabres parked wingtip to wingtip at an air base in Korea during the hostilities there. The reader noted that some of the planes were only inches apart, and that a single strafing run could easily wipe all of them out. Air Force replied, quite correctly in retrospect, that the Communists in Korea never attempted to bomb or strafe US air bases, hence no effort was made to disperse the planes.

Now, how about Vietnam?

Released photographs of the Viet Cong mortar attack on Vietnam's Bien Hoa airfield several months ago, an attack in which a hundred mortar shells destroyed about a dozen parked B-57 bombers, clearly show that the airplanes were parked dangerously close together. I know there is room at Bien Hoa to build revetments, and to separate each parked plane by a good many feet. . . .

[Recently] the Air Force released another photograph, showing Convair F-102s parked at another airstrip in South Vietnam. The caption explained that efforts were being made to disperse the airplanes in order to avoid another "Bien Hoa incident." Yet the photo clearly showed that the planes were *still* parked within a few feet of each other, separated only by walls of sandbags piled waist high.

While the Air Force was releasing that F-102 photo, the accidental ground firing of machine guns wiped out nine T-28s and one Cessna at Laos' Vientiane airport and damaged several other aircraft. This resulted in the loss of more than half of the operable fighting strength of the Laotian Air Force. . . .

Robert F. Dorr
San Francisco, Calif.

• *Reader Dorr is right. USAF has long protested the vulnerable position of its equipment in Vietnam. When Ambassador Maxwell Taylor saw the wreckage at Bien Hoa on November 1, his observation was quoted in a Saigon newspaper: "I don't like it. I don't like any part of it. Never have they done anything like this before." (See also "Airpower in the News," page 16, December '64 issue.) But the performance was repeated in the attack on Camp Holloway at Pleiku on February 6. And Mr. McNamara says this kind of attack cannot be stopped.* —The Editors

Changing Needs

Gentlemen: I protest the recent announced closing of Olmsted AFB, Pa., and the SAC bases around the country. These cuts are bleeding the Air Force and the country's defense. How can you sit idly by, saying not one word in opposition to the Trojan Horse of economy that is being used as a pretext for the closings?

Your complacency makes McNamara look like he isn't vulnerable to anyone. The recent cuts take a disproportionate bite out of the Air Force civilian employees and the logistics support system. Let's wake up to this fight before the USAF becomes an appendage of the Army Air Corps. This magazine must be aware that the cuts, no matter where they are made, will, in the end, diminish or hinder the strike capabilities of the air arm.

John J. Kovalic
Middletown, Pa.

• *As regular readers know, AFA has fought tirelessly for maintenance of airpower adequate to the nation's security needs. We will continue to do so. But we recognize that the changing character of Air Force weapon systems, coupled with improvements in logistical operations, makes changes in the base and force structures inevitable.*—The Editors

Communications Data

Gentlemen: I am attempting to prepare a triservice history on the development of tactical military communication. Any data, recollections, or suggestions of written and graphic sources will be greatly appreciated, acknowledged, and credited where applicable. Information concerning developments and happenings prior to 1920 are particularly desired.

Lt. David L. Woods, USNR-R
1245 Via Del Mar
Winter Park, Fla.

AIRPOWER in the news

By Claude Witze
SENIOR EDITOR, AIR FORCE/SPACE DIGEST

A Rough Road to Peace

WASHINGTON, D.C., FEBRUARY 10

It would be foolhardy at this date to predict the path that will be followed by events in Vietnam, North or South. The bloody exchange of two days ago, which started with a Viet Cong attack on an American installation at Pleiku, has some things in common with the Gulf of Tonkin crisis of last summer. The most important may be that it continues the pressure on the United States to drop its facade as an "adviser" to South Vietnam.

To begin with, the withdrawal of 1,800 US dependents from South Vietnam lends veracity to our determination. It can leave no doubt in the minds of the Communists that if escalation of the war is what they want, we will be prepared for it. Then there is the movement of a Marine Hawk missile battalion into the theater. Less than eight months ago this country was unwilling to admit it had jet airplanes in South Vietnam, even when they were clearly visible on the ramps at a public airport. The 1954 Geneva accord bans the introduction of any new weaponry to Vietnam. We did not sign this agreement, but for a long time we said we would observe its terms. In fact, a high Administration official said not many months ago, "We will not accuse ourselves of violating it." This was his argument for not announcing that RF-101s and F-100s were based in South Vietnam. Communist intelligence being as good as it is in that part of the world, it is doubtful that this policy altered the enemy's conduct. It did deprive the American people of some essential military information. That disguise was penetrated when we moved modern equipment to the front in early August. Now the Hawk battalion is on the job at Da Nang, where its very presence should serve as a deterrent.

There is no way to overlook the fact that our reaction to the Viet Cong raids of February 7 mark a turning point in the war. The first announcement from the White House defined the issue as the infiltration of personnel and equipment from North Vietnam. There also was a statement to the effect that Hanoi was ordering and directing the most recent attacks on two South Vietnamese airfields, two US barracks areas, several villages, and one town. If these raids differed in any respect from the assault on Bien Hoa airfield three months earlier or the bombing of the Brink Hotel officers' quarters in Saigon, it was not recognized.

More details were given by Defense Secretary Robert S. McNamara and Undersecretary of State George W. Ball at a press conference later in the day. Firm US casualty figures showed seven dead and 109 wounded. Five helicopters were destroyed, others damaged, along with some fixed-wing aircraft. All, presumably, was Army equipment. Mr. McNamara indicated that the decision to carry out retaliatory raids was made in Saigon and that it won Presidential approval only after he had consulted with the National Security Council. It had been widely publicized for months past that the military, reportedly with the support of Ambassador Maxwell D. Taylor, was pressing for this kind of action after some of the earlier provocations, if not as a step to cut down on Viet Cong aggressiveness in the day-to-day war. The main point appears to be that President Johnson has thrown his support to the hawks, as opposed to the doves, in his own official family.

As explained by Mr. McNamara, the Viet Cong raids were viewed as a "test of the will, a clear challenge of the political purpose of both the US and the South Vietnamese governments. It was a test and a challenge, therefore, which we couldn't fail to respond to—which neither the South Vietnamese government nor the US government could fail to respond to—without misleading the North Vietnamese as to our intent and the strength of our purpose to carry out that intent."

The realization that the Viet Cong, by themselves or provoked from Hanoi, have been testing our will, seems a little late. Of course the last major assault was the one at Bien Hoa, and it took place just days before our national election. And it is since that election that a growing rumble of discontent has been coming down from Capitol Hill. A little over a month ago the Associated Press queried eighty-three senators and found thirty-one of them favored negotiating with the Communists, but only if the military situation were improved. When the test of our will took place on February 7, a number of congressional committees were about to convene with questions about our military stature and what we intend to do with it. If Hanoi knew more about the machinery in Washington, it might have delayed this test.

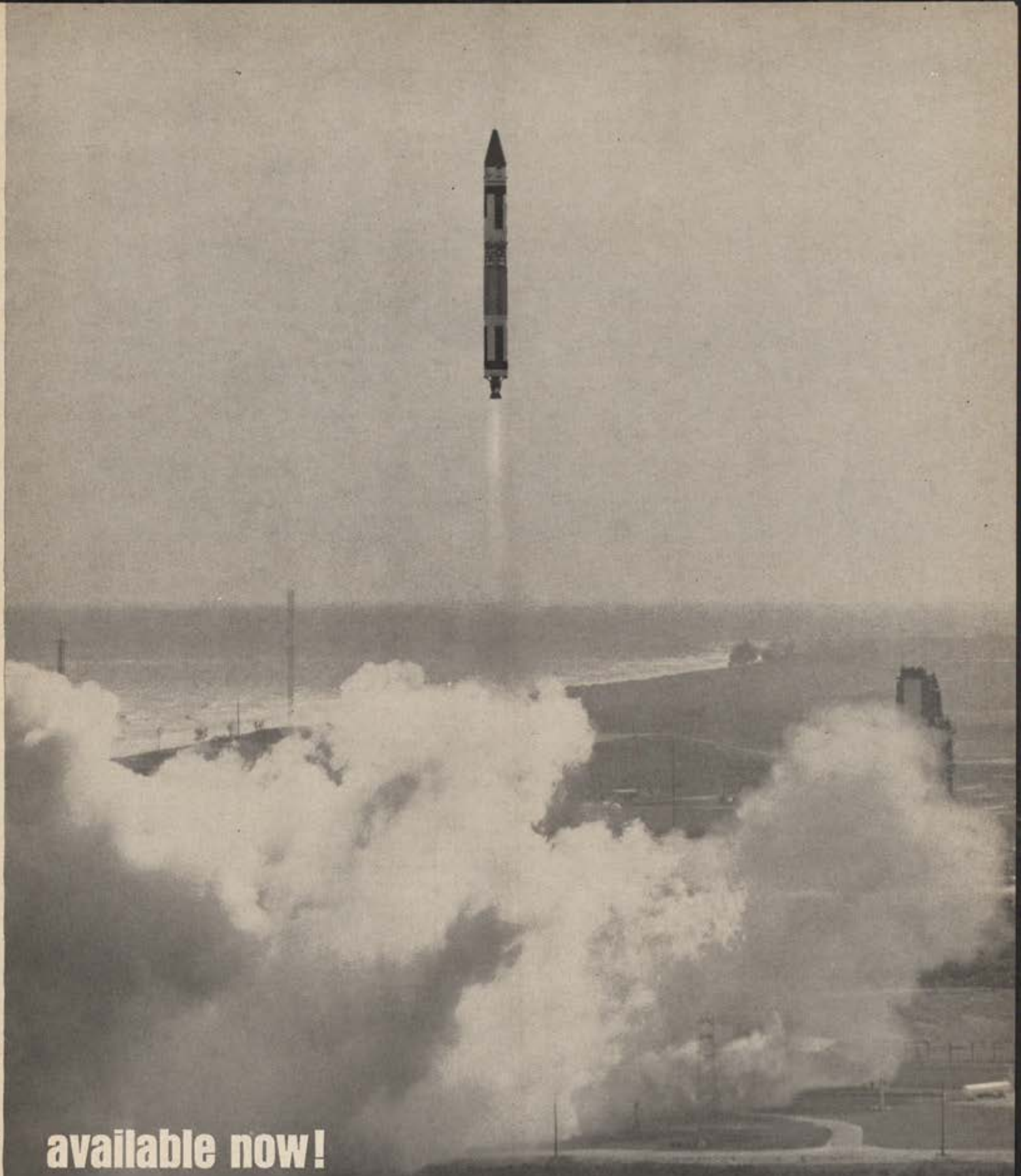
It is interesting that up to this time there has been an effort to make it appear that firm military action had to be carried out by the South Vietnamese, not the US. And, further, that this decision by Saigon would be possible only if that capital achieved what both we and the natives consider a stable government. Nothing was said on February 7 about the stability or instability of the Saigon regime. The average American cannot be blamed if his opinion is that the South Vietnamese are in something close to a state of anarchy. Certainly Ambassador Taylor's long-time stand that a stable Saigon government can be achieved has all the earmarks of a fatuity.

Then there was the subject of the security provided in South Vietnam for American men and equipment. This was hashed over after the Bien Hoa raid of early November, when Viet Cong mortars destroyed a substantial amount of USAF equipment. Our Air Force had been alarmed for many months about the security problem, but in Vietnam it had the responsibility for protecting its own equipment taken away.

Of Pleiku, Mr. McNamara explained, "The attack was carried out in the dead of night; it was a sneak attack. It's typical of guerrilla operations. It's the kind of attack that it's almost impossible to provide effective security against."

Later, he added that the Pleiku area is flat, clear, but dotted with clumps of underbrush and foliage.

(Continued on page 14)



available now!

Titan III, the U.S. Air Force's standard space launch system delivering nearly 2.5-million pounds of thrust . . . handling payloads from over ten tons for a 200-mile earth orbit to two-and-one-half tons for a moon shot . . . mission flexibility ranging from the orbiting of multiple satellites to boosting a complete manned laboratory into orbit. Cost effective. Man rated. Reliable. Even while it is still in R&D, Titan III is launching functional payloads—36 assigned to date.

Got a space mission? Get the facts on Titan III. Write on your letterhead to Dept. RC-400, Martin Company, Friendship International Airport 40, Maryland.

MARTIN MARTIN MARIETTA

"I don't believe," he said, "it will ever be possible—and I think when I say this I reflect the views of our own Joint Chiefs—I don't believe it will ever be possible to protect our forces against sneak attacks of that kind."

The Chiefs of Staff, of course, have made no public statement. The New York *Times* scoffed editorially at the McNamara contention. The paper did not hark back to the fact that old Indian fighters had a way to handle this threat, but it did say that if the Pentagon is going to send our boys to Vietnam, "it has the obligation to provide them with the best protection possible." The implication was clear that the *Times* does not think this is being done.

There was support for that viewpoint in the news from Pleiku. A United Press dispatch said only forty-four of one hundred available Vietnamese guards were on duty when the Communists struck at the airfield and billets. Twelve of them were in a pillbox near the quarters, but "apparently they did not see much of anything." The real alarm was given by a US sentry who found Reds putting explosives against doors and windows. This hero, who was killed in the action, was given credit for disrupting the Viet Cong before they actually entered the billets and tossed grenades into the rooms full of sleeping men. Most of the damage, of course, was done by mortars firing from the middle of a hamlet about 1,000 yards away.

The scene was visited by McGeorge Bundy, the Presidential representative who happened to be in South Vietnam at the time. He was accompanied on his tour, according to United Press, by Gen. William C. Westmoreland. The General is the US commander in Vietnam and is basically responsible for his troops, equipment, and the way the war is fought. The press dispatch reported the General viewed the scene and said, "This is bad, very bad."

It is evident, at this writing, that President Johnson has wide public and congressional support for his reaction to the Pleiku raid. There is no sign, however, that the recently widespread talk about the necessity for a negotiated release from our entrapment in South Vietnam will be curbed. Indeed, the final great virtue of this display of American power probably is that both Moscow and Peking now know we will not discuss settlement from a weak position.

The Answer to a Question

President Johnson's budget for Fiscal 1966, sent to Congress on January 25, is a self-admitted instrument for sociological change. "It begins," he said, "to grasp the opportunities of the Great Society." It remains to be seen whether the Communists will weaken that grasp, as they are trying to do at this moment in Southeast Asia and a number of other cold-war theaters.

As in the case of his State of the Union message, Mr. Johnson has provided an interesting contrast between his approach and that of his predecessor, President Kennedy. When he first took office in 1961, Mr. Kennedy immediately revised the budget prepared for Fiscal 1962 by the Eisenhower Administration. His changes, as shown in the table on page 15, increased the Total Obligational Authority for all defense by nearly $6 billion. The Kennedy budgets consistently stressed the importance of defense and played down the cost of welfare spending.

You can find another contrast by comparing the Johnson budget message of this year with the one he sent to Capitol Hill as a neophyte President in 1964. At that time, he said he was guided by two principles. One was that spending by the federal government, in and of itself, was neither good nor bad. He said it was bad when it produced overstaffing of agencies, needless duplication of functions, poor management or services that cost more than they are worth, or "intrusion of government into areas where it does not belong." It can be good, he said, when it efficiently works in the interests "of our national strength, economic progress, and human compassion."

The spending that Mr. Johnson endorsed in 1964 was drawn for the most part from Kennedy programs, although the new White House occupant pressed hard for economy. Another change last year, carried on for the Fiscal 1966 presentation, is the Johnson adherence to the administrative budget as opposed to the consolidated cash budget. It is acknowledged that different budgets can be used in various ways to give a favorable impression of government finances, sometimes more favorable than justified. As a rule, administrative budget expenditures run much less than cash budget spending, and it is considered politically astute to publicize this kind of arithmetic. Mr. Kennedy used the cash presentation, arguing that it "provides a much more complete picture of governmental activities and finances than the administrative budget." Mr. Johnson appears to disagree. His administrative budget spending will run much less than that discussed in a Kennedy-favored cash budget. The most important reason for this is that the administrative budget ignores the giant trust accounts operated by the government, such as the Social Security fund. The example of Fiscal 1964 will illustrate the point. In that year, so far as actual spending is concerned, the deficit in the administrative budget was $8.3 billion. Under the cash budget it was $4.7 billion. When President Johnson returned to the administrative budget form for Fiscal 1965 he stressed a projected cut in expenditures. The cash budget for that year showed no change in estimated spending and would have provided a weaker talking point.

In his new budget message President Johnson said that increased expenditures for health, labor, education, housing, and other welfare programs account for most of the increase in administrative budget outlays. This figure is $99.7 billion, up from $97.5 billion estimated for the current year. Spending in the welfare area will go up $3.6 billion. Tables distributed by the Defense Department show anticipated total expenditures by the Pentagon will be around $49 billion, down $300 million from Fiscal 1965. This includes military assistance programs.

A spokesman for the Pentagon said, "I think we are on a sort of plateau" and that, as the gross national product climbs in the future, Defense will take a smaller proportion of the GNP. So far as the Air Force is concerned, the Total Obligational Authority sought for Fiscal 1966 is $18.9 billion, about $18 billion of it in new requests. The TOA in Fiscal 1965 was $19.4 billion, and in Fiscal 1964 it was $20.3 billion. A procurement breakdown shows that the biggest cut suffered by the Air Force is in the category of missiles, where the TOA has dropped from $2.3 billion to $1.2 billion in three years. TOA for USAF aircraft has stayed fairly solid, currently at $3.8 billion.

If we turn to the category of Research, Development, Test, and Evaluation, the Air Force TOA for Fiscal 1966 is $3.2 billion, about the same as the current year. The funds decline a little for work on airplanes and missiles, but they gain appreciably in the field of astronautics.

The materiel to be sought for the Air Force already has been widely discussed. It ranges from the controversial F-111 of General Dynamics to advanced models of the McDonnell F-4, and Lockheed C-130 and C-141. Northrop

T-38 trainers and the new C-5A are on the shopping list. The missiles include Minuteman and Titan and SRAM, the new airborne missile to arm the B-52 and prolong its life.

The Defense Department can make only a feeble effort at hiding its cool reception to any proposals for fast development of a new manned bomber. While USAF believes —as a matter of basic doctrine—that a mixed force is essential in our strategic arsenal, it is clear that no development of a new manned bomber can be expected for a few years. A Defense Department spokesman, discussing the new budget, said that component development work will be carried on in Fiscal 1966. He said this "will permit us to proceed with the development and deployment of a new manned bomber . . . should that later appear to be desirable."

The spokesman said it is not necessary to make such a decision today, and later added that "it doesn't today look as though it will be desirable." He went on to say it would cost $10 billion to develop and buy 200 manned bombers to replace the B-52 and B-58. Then he wound up the official department position this way:

"I noticed yesterday morning that we had on alert 793 intercontinental ballistic missiles, and that we had deployed 304 Polaris missiles. . . . That missile force is growing and will become larger next year and the year after as additional Polaris submarines are added to the force and as additional Minuteman squadrons are activated and become operational.

"I think you can partially answer the question as to the requirement for a manned bomber yourself, when you ask yourself how would you use 200 manned bombers in the mid-1970s on top of a missile force of a size that I have outlined that was actually in operation yesterday morning."

Well, there are few Air Force officers who will argue the point about a date when development and procurement of a new manned bomber should start. But that is not the question. The question posed by the DoD spokesman is, how would we use them?

The answer is in Air Force Manual No. 1-1, entitled "United States Air Force Basic Doctrine." It is dated 14 August 1964. Here there is a section numbered 3-12 with the subtitle "The Requirement for a Mixed Force of Manned and Unmanned Systems." Copies of the manual can be obtained by any authorized person from the Department of Defense. Apply at the Office of the Chief of Staff, US Air Force.—END

DEPARTMENT OF DEFENSE FINANCIAL SUMMARY

(Fiscal Years in Billions of Dollars)

MAJOR MILITARY PROGRAMS	FY 1961	FY 1962 Original	FY 1962 Final	FY 1963	FY 1964	FY 1965	FY 1966
Strategic Retaliatory Forces		$ 7.6	$ 9.0	$ 8.4	$ 7.3	$ 5.3	$ 4.5
Continental Air and Missile Defense Forces		2.2	2.3	2.0	2.1	1.8	1.8
General Purpose Forces		14.5	17.4	17.6	$17.7	18.1	19.0
Airlift/Sealift Forces		.9	1.2	1.4	1.3	1.5	1.6
Reserve and Guard Forces		1.7	1.8	1.8	2.0	2.1	2.0
Research and Development		3.9	4.2	5.1	5.3	5.1	5.4
General Support		11.4	12.1	13.0	13.7	14.3	14.6
Retired Pay		.9	.9	1.0	1.2	1.4	1.5
Military Assistance		1.8	1.8	1.6	1.2	1.2	1.3
Total Obligational Authority	$46.1	$44.9	$50.8	$51.9	$51.9	$50.9	$51.7
Less Financing Adjustment	−3.0	−1.3	−1.4	−.8	−.9	−1.1	−3.2
New Obligational Authority	$43.1	$43.7	$49.4	$51.1	$50.9	$49.7	$48.6
Adjustment to Expenditures	+1.6	+1.0	−1.2	−1.1	+.3	−.4	+.4
Total Expenditures	$44.7	$44.7	$48.2	$50.0	$51.2	$49.3	$49.0
TOTAL OBLIGATIONAL AUTHORITY BY DEPARTMENT AND AGENCY							
Department of the Army	$10.4	$10.4	$12.5	$12.0	$12.5	$12.0	$12.4
Department of the Navy	12.7	12.4	14.8	14.9	14.8	14.7	15.3
Department of the Air Force	19.9	18.5	19.7	20.6	20.3	19.4	18.9
Civil Defense	—	—	.3	.1	.1	.1	.2
Defense Agencies/OSD (excluding Retired Pay and Family Housing)	.3	.4	.3	.9	1.1	1.2	1.3
Retired Pay	.8	.9	.9	1.0	1.2	1.4	1.5
Defense Family Housing	.5	.5	.5	.7	.7	.7	.7
Military Assistance	1.5	1.8	1.8	1.6	1.2	1.2	1.3
Total	$46.1	$44.9	$50.8	$51.9	$51.9	$50.9	$51.7
MEMO: Increases since FY 1961 in payments to retired personnel and in rates of compensation included above:							
Increased Compensation Rate:							
Military		$ —	$ —	$ .1	$ 1.2	$ 1.6	$ 1.6
Civilian		—	—	.2	.3	.6	.6
Increased Payments to Retired Personnel		.1	.1	.2	.4	.6	.7
Total		$ .1	$ .1	$ .5	$ 1.9	$ 2.8	$ 2.9

News,
Views
& Comments

AEROSPACE WORLD

By Allan R. Scholin
ASSOCIATE EDITOR, AIR FORCE/SPACE DIGEST

WASHINGTON, D. C., FEBRUARY 12

Britain's Labor Government, facing up to the fact that the nation can no longer afford the luxury of a large-scale independent aircraft industry, has canceled two major development projects and may soon cut a third.

Prime Minister Harold Wilson has halted work on two Hawker Siddeley projects—the HS.681 STOL transport and the P.1154 VTOL fighter—announcing that the government will buy Lockheed C-130E transports and more McDonnell F-4 fighters in their place. Formal agreements for these buys were signed by US Secretary of Defense Robert S. McNamara in Washington on February 9.

Mr. Wilson has deferred a decision on canceling the TSR.2 tactical strike reconnaissance fighter-bomber, though he admits Britain could save as much as $700 million by buying the General Dynamics F-111 instead.

British aircraft firms have been heavily subsidized in recent years. In order to build frontline aircraft for its armed forces at acceptable unit costs, Britain has had to count on substantial export sales. But in the past dozen years the British have invested $14 billion in 189 aircraft designs, only ten of which sold 500 units or more. They can no longer afford such deficits, Mr. Wilson declared.

The Prime Minister's announcement that Britain would "increase its order" for Phantom II fighters was the first official indication that the F-4 had been selected for the Royal Navy, as was initially proposed by the Tory government before the election. The Phantom order may now total 300 planes—150 each for the Navy and the RAF. They will be equipped with the Rolls-Royce Spey engine. Some other components may also be built in Britain.

The number of Hercules transports to be bought was not disclosed, but it is estimated they will total fifty to sixty.

☆

A highlight of General LeMay's retirement ceremony at Andrews AFB, Md., February 1 was the surprise appearance of a WW II B-17 in the markings of General LeMay's old 305th Bomb Group, which led the fly-by of modern-day aircraft, witnessed by several hundred top government and military officials as well as a nationwide TV audience. At the ceremony, General LeMay struck a familiar pose before the bomber (*see cut*). The

At Andrews AFB retirement ceremony, Gen. Curtis E. LeMay stands pensively before B-17 bomber with 305th Gp. markings, resurrected for event by AFA with cooperation of Boeing and Litton Industries' Aero Service Corp.

On his first day as USAF Chief of Staff, Gen. John P. McConnell, standing at left, joins other members of US Joint Chiefs of Staff for official photo in Pentagon conference room. Standing alongside him is Gen. Wallace M. Greene, Marine Corps Commandant. Seated, from left, are Adm. David L. McDonald, Chief of Naval Operations; Gen. Earle G. Wheeler, USA, Chairman of the Joint Chiefs of Staff; and Gen. Harold K. Johnson, Chief of Staff of the US Army.

B-17's participation in the retirement ceremony was arranged by AFA with the cooperation of the Boeing Company and the Aero Service Corporation of Litton Industries, which still flies the Fort in aerial survey work.

☆

After years of plotting and arguing, followed by a year of field tests, the Army and the Air Force have arrived at a couple of basic truths about air support for combat ground forces.

It is now evident that heavy USAF four-engine turboprop transports cannot readily leap from clearing to clearing in a forest and that Army efforts to deploy and resupply division-sized forces with swarms of helicopters and light fixed-wing transports under combat conditions is expensive and inefficient.

These are the essential conclusions emerging from the Army's Air Assault II exercises in the Carolinas last Summer and US Strike Command's Goldfire I test of USAF concepts in Missouri last fall.

In the sense that neither achieved its objectives, some observers on each side have called the other's exercise a failure. This may be too harsh an assessment. It should now be obvious to both services that they have been talking about different aspects of the Army's requirement.

Goldfire II, a US Strike Command exercise which was to have taken place in Tennessee in March, has been canceled by the Joint Chiefs of Staff. The reason given by the JCS is that it would serve no useful purpose at this time. Goldfire II was to have tested Air Force and Army tactical support concepts in consecutive two-week periods. The Air Force, despite its shortcomings in Goldfire I, was eager for the competition. The Army, apparently, was not. In the circumstances, the JCS properly decided it was pointless to proceed with the exercise.

The Army has evidently learned that in tailoring its forces to operate with helicopters and light transports it gives up too much firepower to survive for long in combat. Much of the helicopter fleet bogged down, too, because of maintenance problems in the field. The Air Force, in turn, is coming to recognize that, while it can more effectively move troops and equipment into the combat area, the Army needs its own air vehicles to handle "retail" movements of men and supplies within the battle zone.

One positive result of the tests is that they have blunted the ambition of some Army aviators to take over the entire tactical support role, and instead have reconfirmed the Air Force's responsibilities in the whole-

Maj. Leroy Gordon Cooper, USAF, who holds record among NASA astronauts for time in space with twenty-two-orbit mission in May 1963, has been chosen to pilot Gemini spacecraft on week-long flight late this year.

Lt. Cmdr. Charles (Pete) Conrad, selected by NASA to join Major Cooper in third manned Gemini flight, is thirty-four and a native of Philadelphia, Pa. He was a Navy fighter pilot before becoming an astronaut in 1962.

sale end of the close-support business.

Furthermore, the Air Force and the Army are in closer agreement than before on the respective tasks of the Air Force's tactical fighters and the Army's armed escort helicopters. The Army appreciates, as J. S. Butz, Jr., pointed out last month (*see "The Test of Fighter Aircraft,"* AIR FORCE/SPACE DIGEST, *February '65, p. 26*), that its choppers are vulnerable to enemy fighters. In battle-zone troop movements by helicopter, it cannot survive without USAF fighter cover.

The Air Force, with the addition of the F-4C fighter and rough-and-ready C-130 tactics, has come a long way since the Howze Board report toward meeting Army requirements for tactical support. Differences between USAF and the Army are by no means resolved, but for the present the JCS seems content to give both services time to reexamine their respective roles and, under constant prodding by Strike Command, to come up with a mutually respected doctrine.

☆

A news correspondent in South Vietnam recently reported that a South Vietnamese pilot refused to respond to a call for emergency air support from an embattled village, explaining that he was just going off duty for the day.

That pilot was punished, but there have been other comments to the effect that South Vietnamese pilots are reluctant to go in at low level against Viet Cong concentrations.

But when air strikes were ordered on North Vietnam after Viet Cong guerrillas had attacked US bases, South Vietnamese A-1H pilots, led by their commander, Brig. Gen. Nguyen Cao Ky, came in on the deck, pressing home their attack in the face of antiaircraft fire. When reconnaissance planes later assessed the damage, they found the South Vietnamese strikes had been devastatingly effective.

"VNAF pilots are well trained," said one former USAF adviser, now back in the states. "And they don't lack for courage. But you've got to remember that many times they're called on to blast targets in areas where they have friends and relatives. They wouldn't have any hesitation, though, against targets in North Vietnam. They've been itching to get a crack at them."

☆

Close on the heels of the announcement of a new building for the Air Force Museum at Wright-Patterson AFB, Ohio (*see "Space for Our Air Heritage,"* AIR FORCE/SPACE DIGEST, *January '65, p. 40*), plans for another monumental structure to house mementos of aviation history were announced by US government officials.

Detailed architectural designs for the Smithsonian Institution's new National Air and Space Museum in Washington, D. C., were unveiled at a press conference late in January.

The huge building (784 feet long, 250 feet wide, 97 feet high), expected to cost $40 million, will be situated in the Smithsonian museum complex on the Washington Mall opposite the National Gallery of Art. Plan-

(Continued on page 19)

COMMUNICATIONS

Massive radio transmitters to cut past the "Bamboo Curtain" with the message of freedom. "Walkie-talkies" to pierce the impenetrable jungle. "Stand-still" satellites to bring television from across the oceans. This is Hughes at work in communications.

Sometime next year, in the Philippines, the United States Information Agency will go "on the air" with one of the most powerful radio stations on earth. Its purpose: To reach deep into China with the truth about the Free World.

The station will have ten giant, 250,000 watt transmitters now being built by Hughes. Contrary to most trends in electronics, its king-size parts must be handled by wrenches instead of tweezers. Tubes are big as bushel baskets, wires are like cables to handle the enormous power loads.

Paradoxically, although these giants need to send signals over thousands of miles, in some ways it is more difficult to make radios work just a few miles apart in dense jungle. Conventional types of man-carried radios can't cut through. High frequency radios, which "bounce" signals off the ionosphere, can. So today, our Special Forces troops are field testing a new Hughes "Manpack" high frequency single sideband radio. Manpack weighs in at just 25 lbs., is fully transistorized, has re-chargeable batteries, can send and receive both voice and telegraphy.

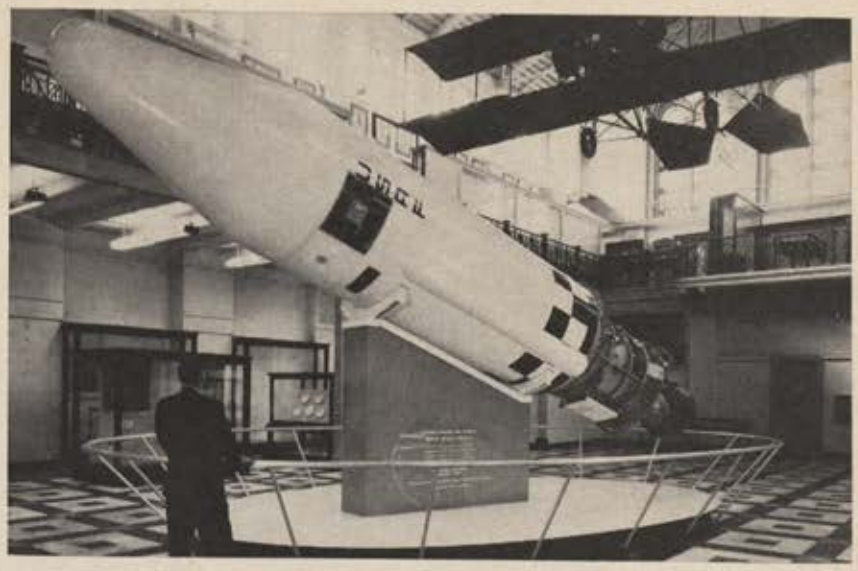
The ability to apply new knowledge to useful purpose whether in the jungle or in space is a Hughes hallmark. The Syncom satellite, created and built by Hughes, may well rank as one of the major communications advances of our time. Its unique ability to "stand still" over a point on earth permits uninterrupted television and telephone communications, 24 hours a day.

The first Syncom has amassed more communications time than all other such satellites combined. The "Olympic" Syncom, launched last fall, enabled you to see the opening of the Games "live" in the first trans-Pacific television presentation.

"Early Bird" the Syncom-type satellite built by Hughes for Comsat, will give the first uninterrupted TV and phone service 24 hours a day across the Atlantic Ocean. Just three such satellites could

HUGHES

HUGHES AIRCRAFT COMPANY



USAF's versatile Agena space vehicle is displayed in Smithsonian Institution's Air Museum in Washington below Wright Flyer after being presented to Museum February 4 by its manufacturer, Lockheed Missiles and Space Co.

ning for the building has been under way since 1958 when Congress authorized $1.9 million to develop the concept.

Many exhibits are still to be selected, but the Wright brothers' *Kitty Hawk Flyer* will be on central display as will Lindbergh's *Spirit of St. Louis* and John Glenn's space capsule. The present Air and Space Museum houses only five percent of some 200 aircraft, plus engines, spacecraft, and missiles that have been given to the Smithsonian. The new museum, despite its size, is expected to house only ten percent of available exhibits, so displays will be changed frequently. The remainder of the historical items of equipment owned by the Smithsonian are stored in nearby Maryland.

Some spacecraft, like the Saturn rocket, are already too large to fit under the new building's 110-foot ceiling and will have to be shown in model form.

☆

NASA was to launch the next in the Ranger series of spacecraft to photograph the moon on or about February 17 from Cape Kennedy, Fla., and will follow with another in mid-March. Objectives are to provide further scientific information on the moon's surface in preparation for the unmanned Surveyor and manned Apollo moon-landing programs.

Both spacecraft, which will be named Ranger VIII and IX if they are launched successfully, carry six television cameras to photograph the moon. Three wide-range cameras are identical to those in Ranger VII, which returned more than 4,000 photos last July. The other three are more sensitive to light than those in Ranger VII. With them, NASA hopes to photograph darker areas on the moon—possibly the Mare Tranquillitatis and Mare Vaporium. Each Ranger is again equipped to transmit 4,000 photos or more in the last sixty-five minutes before impact.

The Ranger spacecraft are designed and built by the California Institute of Technology's Jet Propulsion Laboratory, with a number of industries furnishing subsystems and components. Cameras were designed and manufactured by the Astro-Electronics Division of the Radio Corporation of America. Launch vehicles are Atlas-Agena Bs.

In other space notes, Mariner IV has covered 128 million miles on its journey to Mars as this is written. After eleven weeks in space—it still has twenty-two weeks to go—systems in the spacecraft are performing normally, transmitting 8 1/3 bits of information a second to NASA's Space Flight Operations Facility at Pasadena, Calif., on cosmic rays, cosmic dust, magnetic fields, radiation, and intensity of charged particles it encounters in space. Mariner is gradually losing speed in its solar orbit. A month ago it was clocking 70,000 mph; now its down to 64,500 and dropping by 178 mph per day.

The Soviet Union has tested a new missile with a range of at least

(Continued on following page)

CA-

link all the nations of the earth.

Ground stations are the vital earth-based "ears" of satellites. Plans are under way to build a satellite ground terminal in Arkansas. It can be used for research, for space communications research and other experimental activities including cooperative work with other countries. Its antenna will "see" satellites over both the Atlantic and Pacific Oceans.

These, and other communication achievements, such as traveling wave tubes for spacecraft, new systems using laser beams, speech compression techniques and new tropospheric-scatter systems—illustrate how Hughes is helping create a new world with electronics.

8,000 miles. Tass, the Soviet news agency, described the rocket as a multistage vehicle which hit its target in the Pacific 1,500 miles southwest of Hawaii "with great accuracy." The test was so successful, Tass reported, that further shots in the test series were called off.

☆

One of SAC's new EC-135C airborne command post aircraft was shown to the press at Andrews AFB, Md., February 3, on the day the airborne command post operation completed four years aloft, totaling more than 35,000 hours on station.

Composite photomontage shows transition flight of XC-142A triservice V/STOL transport from takeoff in vertical mode to conventional forward flight at Ling-Temco-Vought plant in Dallas, Tex. Plane, produced by LTV with Ryan and Hiller as major subcontractors, will carry 32 troops or 8,000-pound cargo.

Maj. Gen. Alvin C. Gillem, II, SAC's Deputy Director of Operations, who had been on duty during the previous night, answered newsmen's questions about the operation and equipment aboard the plane.

Three times daily an airborne command post takes off from Offutt AFB, Neb., and remains on station until it is relieved by the next flight. Until last summer the command post employed converted KC-135A tankers. But since September all missions have been flown in new EC-135Cs, equipped to communicate with SAC headquarters, the Pentagon, and SAC bases and aircraft anywhere.

Normally there are eighteen to twenty men aboard the aircraft—a four-man crew, four to six communications specialists, and the command post of ten men, always headed by a general officer.

The command post ordinarily has no command authority, General Gillem explained. It represents a backup for SAC's underground command post at Offutt. If a nuclear attack should knock out the underground post, the airborne unit assumes command over all SAC forces.

General Gillem outlined the precautionary measures that would precede any instructions by the airborne post to launch a counterstrike. They include authentication of Presidential orders and a two-key arrangement within the plane. Each man in the command post is armed, and a metal box containing target codes and passwords emits a loud racket if any attempt is made to open it.

"If I ever tried to issue a 'Go' order without full authorization," said General Gillem, "I'd probably find the revolvers of seven or eight men at the back of my head."

Aircraft of US origin were destroyed on the ground in a variety of ways during the month. Most serious was, of course, the February 7 Viet Cong raid on the US base at Pleiku, where five US Army helicopters were destroyed and eight more damaged, along with two light transports and three O-1A fixed-wing observation planes. (*For a detailed report on that attack and the US reaction it triggered, see "Airpower in the News," p. 12.*)

Earlier, on January 24, a series of explosions, apparently accidental, destroyed nine T-28s of the Laotian Air Force at Vientiane. The accident, if that's what it was, occurred when one T-28's machine guns were inadvertently fired, setting flame to a fuel tank which exploded and set off bombs on other aircraft in the line. The US promptly turned over nine T-28 replacements to the Laotians.

In Edmonton, Canada, a self-appointed saboteur broke into a plant performing inspection and repair on some F-84Fs earmarked for the US Air National Guard, killed a civilian watchman, and damaged four Thunderjets before he was caught.

☆

Mission With LeMay: My Story, by Gen. Curtis E. LeMay, written in collaboration with the distinguished author, MacKinlay Kantor, will be published by Doubleday this fall. Mr. Kantor first met General LeMay when the recently retired USAF Chief of Staff commanded the 305th Bomb Group in England in 1943 and Kantor flew with him as a war correspondent. They have been friends ever since. Two years ago, General LeMay accepted Kantor's offer to assist him in writing his autobiography. They represent a top professional team —General LeMay the most widely known Air Force leader of our time, and Kantor, whose thirty-four books include the Pulitzer Prize winner of 1956, *Andersonville*.—END

INDEX TO ADVERTISERS

Air Force Times 77
Autonetics, a Div. of North American Aviation, Inc. 1
AVCO RAD 42
Beech Aircraft Corp. . . . . 82 and 83
Bristol Siddeley Engines Ltd. 4
Burroughs Corp. 63
Clifton Precision Products, Div. of Litton Industries 78
Colt Industries, Inc. 24
Computing Devices of Canada Ltd. 7
Defense Electronics, Inc. 81
Delco Radio, Div. of General Motors Corp. 21
Douglas Aircraft Co., Inc. 84 and 85
Hughes Aircraft Co. . . . . 18 and 19
Kehl Travel Service, Inc. 80
Lockheed Georgia Co. . . . . 8, 9, 72, and 73
Martin Co., The 13
McDonnell Aircraft Corp. . . . Cover 4
Northrop Corp. . . . 2, 3, 46, and 47
Ryan Aeronautical Co. 55
Sperry Gyroscope Co., Radiation Div. . . . . Cover 2
Sperry Phoenix Co. 60
Sylvania Electric Products, Inc. 71
Vertol Division Boeing . . . . . Cover 3
Western Union . . . . . 22 and 23
Westinghouse Electric Corp. . . . . 56 and 57

SOME OF OUR PRODUCTS NEVER GET OFF THE GROUND

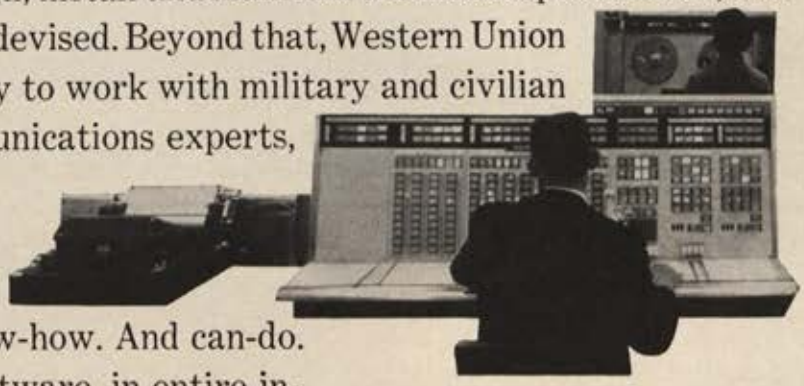
They aren't supposed to. ■ Like this helmet mounted radio receiver for field communications. Or its companion miniature transmitter. ■ The U. S. Army Electronics Research and Development Laboratories, Ft. Monmouth, New Jersey, have contracted for these new all-transistor units for service test use. For the first time, communications travel with the squad, lighten the load that soldiers must take into battle, and—in many cases—provide the means to save lives by doing away with hand signals or shouted commands. Fighting men are able to react to orders *instantly*—regardless of their field positions, the size of their units, or the combat conditions surrounding them. ■ Delco Radio goes *wherever* miniature portable communication systems can help solve a problem. ■ Perhaps we can help solve yours. Forward your specifications to Delco Radio, Military Requirements Department, Kokomo, Ind.

DELCO RADIO
DEPENDABILITY
RELIABILITY

Division of General Motors, Kokomo, Indiana

Capability: When you think of communications capability, bear this in mind. Western Union has proved that

it has the administrative, technical and engineering skill to conceive, design, install and maintain the most sophisticated, complex communication systems ever devised. Beyond that, Western Union has proved that it has the flexibility to work with military and civilian government engineers and communications experts, and with the operating agencies, in the development of systems that meet each user's needs.



Control center in the AUTODIN system

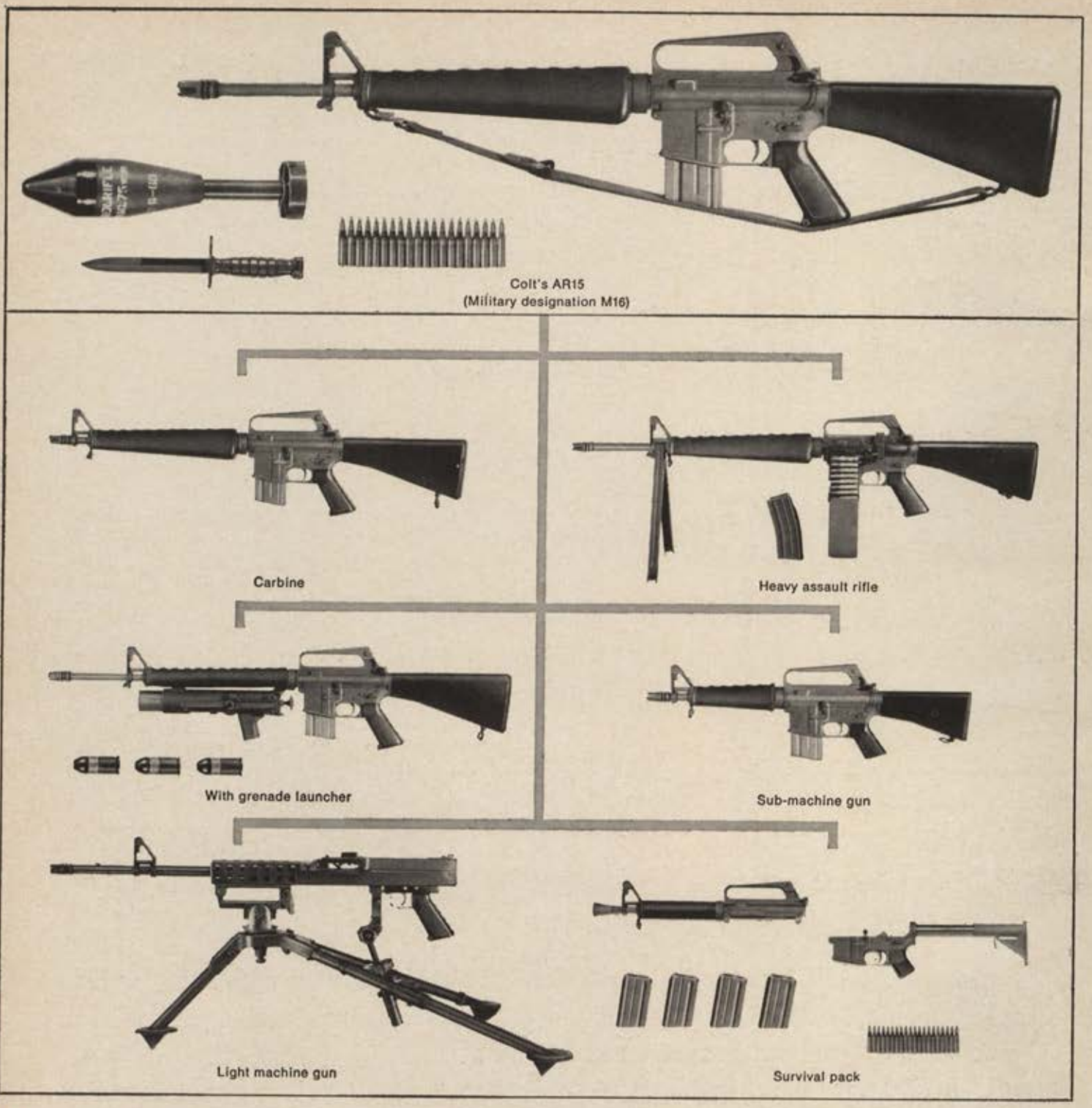
That takes *doing*. And know-how. And can-do. And has-done, in hardware, in software, in entire information systems.

It takes experience and vitality. It demands a penetrating insight into the

user's needs. It calls for technical understanding that keeps pace with today's advancing knowledge. It requires managerial judgment; the resources, techniques and tenacity that bring a contract in as ordered, as promised.

In short, it takes capability. Western Union Capability. You saw it at work in the development of the Defense Department's AUTODIN (Automatic Digital Network). This complex system—the world's most advanced digital data network, for which Western Union is the prime engineering contractor and system manager—proves the point: Western Union has the ingenuity to develop, install and service communications systems of the highest capabilities.

That's Western Union for you.



We system-service defense

Colt's AR15, now being delivered to U. S. Army, Air Force and Navy units, represents an unprecedented advance in rifle design and power.

Produced by our Colt's Firearms Division, the fully-automatic rifle is exceptionally simple to use, weighs less than 7 pounds, fires a high-velocity 5.56mm round at a rate of 750 per minute.

In anticipation of further defense requirements, our engineers have developed the related weapons, shown above, for U. S. evaluation.

Other divisions system-service defense with missile equipment, power and pump complexes, naval engines.

But system-servicing defense is only one of our skills. For industry, agriculture and government, our divisions meet other needs, solve other problems.

These divisions are: Fairbanks Morse Power Systems, Fairbanks Morse Pump, Fairbanks Morse Weighing Systems, Pratt & Whitney Machine Tool, Colt's Firearms, Chandler Evans Control Systems.

Headquarters: 1290 Avenue of the Americas, New York, New York.

Colt Industries

AIR FORCE
MARCH, 1965

After a careful, objective study of a complex and difficult subject, a congressional subcommittee has urged that the US vertical-takeoff-and-landing development program be expanded. Many V/STOL problems remain to be solved but the advantages that efficient, field-tested V/STOL aircraft would offer in terms of military mobility would be revolutionary. The subcommittee report raises the question . . .

How Serious Are We About V/STOL?

By J. S. Butz, Jr.
TECHNICAL EDITOR, AIR FORCE/SPACE DIGEST

CONGRESSIONAL frustrations encountered in dealing with the Defense Department have seldom been illustrated more vividly than in its attempts of the past nine months to breathe some life into this nation's V/STOL program.

Last summer the House Armed Services Committee's special subcommittee on research and development, headed by Rep. Melvin Price (D.-Ill.), conducted a comprehensive and searching study of the vertical-lift airplane problem. In fourteen formal hearings the subcommittee heard lengthy testimony from thirty-four expert witnesses from both government and industry. Countless informal discussions were held.

The transcript of the hearings makes it clear that the subcommittee believes that the US is neglecting a new technology which can have a revolutionary influence on military organizations and operations in the next ten to twenty years. The transcript also shows that the subcommittee was determined to understand the technically complicated V/STOL situation in its entirety. Its members asked the proper questions and dug for the answers.

The congressmen did a good job on a difficult and important task, which undoubtedly has been little noticed by their constituents and the general public and little heeded by the civilian leadership in the Department of Defense. For the new FY 1966 budget, V/STOL airplane funding is reduced far below that for the current year, or roughly from $50 million to $10 million. The US program apparently is going to slow down drastically while the Administration tries to work out a cooperative program with our European allies. This policy is at considerable variance with the Price subcommittee's conclusions, which called for the US to conduct, as soon as possible, operational tests of V/STOL fighters in the field to clear up key uncertainties which still prevent intelligent military planning. And the subcommittee transcript makes it clear that the Administration does not share the urgency about V/STOL shown by Congress, many US aircraft leaders, and some European nations. Consequently, the V/STOL program seems destined to move at a pace well below that technically possible.

V/STOL Issues

The subcommittee began its V/STOL review by looking at the complete history. It noted that from 1950 through 1961 the US had spread its funds thin by spending more than $100 million on eighteen separate V/STOL research airplane projects. Most of these culminated in successful flight tests. The main accomplishment of this period was the gathering of technical proof that a wide variety of vertical-takeoff-and-landing airplanes was feasible. These types included: tilting wings, tilting propellers, tilting ducts, tilting jet engines, deflected jet engine exhausts, tilting rotors, and tail sitters.

In the latter 1950s, as the basic feasibility questions were answered, V/STOL progress began to bog down in technical problems:

- The powerful downwash from propellers and jet engines, which during landings and takeoffs from unprepared sites can raise geysers of sand, rocks, and debris that choke engines, blind pilots, and damage airframes.
- The serious weight and cost penalty of V/STOL aircraft. The penalty today is much less than in 1960 because the technology has improved, but most es-

(Continued on following page)

timates still conclude that a V/STOL airplane must be at least twenty-five percent heavier and more than twenty-five percent more costly than a conventional aircraft that performs the same mission.

- The poor handling qualities of V/STOL airplanes, all of which have been unstable under some of the most critical slow flight conditions. This situation is being improved, but much remains to be done.
- The degree to which turbine-engine performance can be improved, because the powerplant thrust-to-weight ratio and fuel consumption are key factors in improving V/STOL airplane performance.
- Negative lift created by the very-high-speed airflows from propeller slipstreams and jet-engine exhausts as they spread out under V/STOL aircraft near the ground. These high-speed flows passing along the aircraft's undersections can cause the aircraft to literally bounce on the ground during landing and increase the power needed to take off.
- The amount of hovering and slow speed flight required for missions over unfamiliar territory and while locating and evaluating strange landing sites. For transport-type V/STOLs this average hover-time requirement is critical for it dictates the type of powerplant that will provide optimum payload/range performance. For high-performance jet-powered V/STOL fighters, this hover time must be short or else their effectiveness will drop quickly to unacceptable levels. Command and control techniques must be improved substantially if large numbers of V/STOL aircraft are to move around a battle area efficiently.
- The great difficulty of maintaining, resupplying, and protecting V/STOL aircraft which are dispersed for protection against high-yield weapons. For example, a 30,000-pound V/STOL fighter could expend more than 60,000 pounds of fuel and ordnance in a day of hard fighting. Resupply obviously presents problems with 10,000-pound-payload V/STOL transports. Protecting many score of these remote sites from destruction by small enemy groups would be another major problem, as the news from South Vietnam vividly illustrates.

Other technical and operational problems could be listed ad infinitum. The subject is complex, and any review of V/STOL research results and development plans could easily go astray by concentrating on the mass of details or by reaching conclusions that were more emotional than factual.

The Price subcommittee was not trapped in either fashion. Its conclusions were concise and clearly identified the key problems. The report's credibility is strengthened considerably by the fact that its conclusions did not conflict in any basic manner with testimony from industry, the military, or Dr. Harold Brown, Director, Defense Research and Engineering.

Operational Tests

For some years, it has been recognized that the big hole in our V/STOL program is the lack of information about operating these aircraft in the field. Precise information is needed about command and control, navigation in remote areas, the amount of hover time needed on an average mission, site security, maintenance, resupply, and other areas.

The first formal call for operational tests came in 1960 from an *ad hoc* committee headed by Professor Courtland Perkins of Princeton University, which reviewed the V/STOL effort for the Department of Defense. This committee concluded: "The state of the art in V/STOL technology has advanced to the point where V/STOL aircraft capable of meeting operational requirements can be developed. The full military usefulness of V/STOL must be demonstrated through operational evaluation. Unless a program for operational suitability is initiated, the state of uncertainty that exists today will continue."

This same state of uncertainty has continued for the past five years and, if the FY 1966 budget is any indication, it will persist for another five years.

Dr. Brown talks of V/STOL in general and the operational testing problem specifically in the following terms. He says, "My conclusion at this time is that we very probably will want some V/STOL aircraft in the future. I cannot say when. That depends to a large degree on the technology, and to a very large degree on operational evaluation which has not been carried out, and cannot be carried out until we have a number of these machines suitable for such evaluations."

Dr. Brown also said last summer, "The current emphasis in our V/STOL program is placed on obtaining V/STOL operational experience." Yet only one of the five current US V/STOL programs—the XC-142—has been scheduled for field tests. Five of them will be built and, as reported by the subcommittee, this ". . . is a very modest number for such an investigation." All of the other V/STOLs—the Army's XV-4A and XV-5A and the triservice X-19 and X-22—are considered officially to be research aircraft. Only one or two of each will be constructed and a limited number of flight hours is programmed.

The US has entered into a three-nation cooperative series of tests for V/STOL fighter evaluation. The tests will be made by England, West Germany, and the United States with a force of nine Hawker P.1127 aircraft. They are to begin this spring and continue for six months. No one in the United States, including Dr. Brown, reports that these tests can provide all the information needed on V/STOL fighter operational potential. The P.1127, for instance, has a maximum endurance of about one-half hour at sea level after a vertical takeoff, and a limited ordnance-carrying capacity.

The Price subcommittee judged that none of the currently supported DoD programs can provide the operational information needed on V/STOL fighters. Its primary recommendation was for DoD to "develop and acquire sufficient quantities of V/STOL tactical fighter aircraft to determine [their] . . . operational suitability . . . for . . . the tactical air missions of the military services."

The subcommittee's second recommendation calls on DoD to delay no longer in starting the development

of new and improved turbine engines. First, the report stated the universally recognized fact that "the propulsion system paces the over-all V/STOL program." Then it said, "If V/STOL has a place in the military mission, it is imperative that development be vigorously accelerated on both a lift-cruise and a direct-lift jet engine."

One of the most revealing facets of V/STOL history is the rapidly changing viewpoints on engines. In 1960, when the Air Force was attempting to start development of a Mach 2 V/STOL fighter, two engines were being considered—the Pratt & Whitney JT12 and the General Electric J85. These small engines were in the 3,000-pound-thrust category and consequently could have a better thrust-to-weight ratio than larger engines. The better of the two had a thrust-to-weight ratio of 7 to 1 in the cruise-engine configuration and around 10 to 1 as an ultralight lift engine that operated only during takeoff and landing. This was considered marginal performance by many in the Air Force and industry. Experts at the time said that lift engine thrust-to-weight ratios of 12 and maybe 15 would be necessary to give high-speed V/STOL fighters the range and payload to compete effectively with conventional airplanes. Primarily for this reason the Tactical Air Command turned thumbs down on the Mach 2 V/STOL fighter after it had been approved by the Air Staff and pushed the airplane that became the F-111 (the TFX).

The engine-performance picture has changed radically and unexpectedly for the better. Advanced engine research, sponsored primarily by the USAF, has paid off handsomely. One indication was given to the Price subcommittee by Republic Aviation officials in a brief review of their 1963-1964 ADO-12 (advanced development objective) study for the Air Force. This was to provide guidance for prototype development of subsonic and supersonic V/STOL fighters. Republic reported that the consensus of the engine manufacturers was that the next generation of lift engines could have a thrust-to-weight ratio of 25 to 1, and that lift-cruise engines would reach 8 to 1. The lift-cruise type are basically conventional turbojet or turbofan engines with swiveling nozzles or other relatively heavy devices for diverting the thrust downward during takeoff and landing.

Dr. Brown disagreed with these estimates somewhat in his testimony. He said that 18 to 1 thrust-to-weight ratio was more likely for lift engines, with growth potential of 20 to 1 possible before radically new high-temperature materials would be needed.

In any event, engine performance potential is much better today than anyone thought possible in 1960. At first glance, one might think that V/STOL was home free. This isn't true, and there is as much concern over V/STOL performance limitations as ever because the requirements change faster than performance improves. For instance, the USAF's V/STOL fighter and transport requirements are much more stringent than they were in 1960, and even the new engine technology isn't quite good enough to handle them. This is true of Army and Navy requirements as well. This situation seems to annoy the subcommittee more than any other single factor.

Preferred V/STOL Aircraft Types

Strong agreement has been generated during the past five years in designs for V/STOL aircraft.

Two types of engine systems generally are considered proper for V/STOL fighters. The first is for fighters that operate on the deck and have a maximum speed of Mach .9 to Mach 1.2. Such an aircraft would have a "composite" arrangement consisting of a lift-cruise engine plus three or more pure-lift or lift-fan engines. The lift-cruise engine would be sized to deliver a thrust equal to thirty to forty percent of the aircraft's maximum takeoff weight, which is also equal to the maximum thrust requirement in level flight. The added thrust needed for vertical takeoff would be supplied by pure-lift engines, as in the French Mirage III-V or by lift-fan engines, as in the Army XV-5A.

Considerable reduction in payload/range performance is reported if the lift engines are eliminated to simplify the arrangement. This necessitates increasing the size of the lift-cruise engine so it can provide all the power at takeoff. Such an exchange of a heavier engine for a lighter one would yield a weight penalty, but the most critical penalty would be in sharply increased fuel consumption for the lift-cruise engine, which would have to be operated at part throttle during most of the mission.

However, for very-high-performance fighters that operate at high altitudes and above Mach 3.0, the lift-cruise engine is reported to be adequate by itself. In this speed and altitude regime, a large engine is needed in the first place. It can deliver all the thrust needed at takeoff and can be operated at high power during the whole mission with good fuel consumption.

In the V/STOL transport area, most agree with Dr. Brown when he says, "My own judgment is that the logistic and observation aircraft will be of the tilt-wing, or tilting-propeller type." In effect, Dr. Brown is saying that only about ten minutes of hover or very slow flight time will be required on V/STOL transport missions. For this short time, the "hover efficiencies" of the XC-142, X-19, and X-22 are approximately equal to that of a helicopter. That is, their propulsion systems, plus fuel for hover, are about equal to a helicopter's.

The Germans and English obviously have other ideas, for they are jointly funding development of the Dornier DO-31, a V/STOL transport powered by a "composite" arrangement of lift-cruise and pure-lift engines. One of the major gambles in this design is that only about five minutes of hover and very slow flight will be needed on a typical mission. For this very short time, a turbojet-powered V/STOL transport has about the same hovering efficiency as a helicopter. Consequently, it will pay a relatively small penalty for its V/STOL capability and will have considerably higher cargo-carrying productivity than

(Continued on following page)

Vought-Hiller-Ryan XC-142 — Five of these 37,000-pound, tilt-wing transports will be delivered to the military services for field evaluation of their military usefulness. This will be the first such field evaluation of any US V/STOL aircraft. Maximum vertical lift payload is 8,000 pounds. Combat radius is 200 nautical miles, and ferry range is 2,600 nautical miles. Cruise speed is 250 knots. The first test aircraft has completed the complete transition from vertical to horizontal flight and back again. The flight tests are progressing well, and a total of 900 hours are planned. Through Fiscal 1965 about $115 million will have been invested in this triservice development aircraft.

General Electric-Ryan XV-5A—A "composite" power system is used in this research aircraft which has a maximum takeoff gross weight of 12,300 pounds. Two J85 turbojets provide about 5,300 pounds of thrust in level flight. For vertical flight their exhaust drives flat fans in the wings which "multiply" the thrust nearly three times to 13,946 pounds. This provides proper power in each flight regime at relatively low fuel consumption. The first XV-5A transition flight was made in October 1964. Flight testing by Republic Aviation is going smoothly. No operational tests are planned. Army investment will be $16.5 million by the end of FY 1965.

Bell Aerosystems X-22—Two of these 15,000-pound "four-duct tandem" airplanes will be delivered to the DoD. Originally 355 hours of engineering flight test and 450 hours of operational field tests were planned. The operational test program apparently has been dropped. First flight is scheduled for late spring. The Navy is interested in this aircraft because its ducted propellers give a compact configuration. About $26 million has been invested in the X-22 by DoD.

HOW SERIOUS ARE WE ABOUT V/STOL?

propeller-driven V/STOL transports. However, if more than five minutes of very slow flight is needed the DO-31 will pay a heavy penalty in fuel and its attractiveness will quickly drop.

Cooperative US/European V/STOL Program

Strong V/STOL research programs have been conducted during the past ten years in Great Britain, West Germany, and France. The most progress has been made in V/STOL engine and fighter design. European technical progress was so rapid that it seemed certain that the United States would be an also-ran in the V/STOL field.

Unfortunately, the European competition now has largely disappeared due mainly to funding problems. In England the Hawker P.1154, supersonic follow-on to the P.1127, has been canceled. The status of the VJ-101D and VAK-191B aircraft in West Germany is hazy. Only in France does there appear to be a serious intent to develop a V/STOL attack aircraft and put it into operational service. This airplane is the Mirage III-V—a Mach 2, 30,000-pound fighter.

Currently, England, West Germany, and the United States are seriously discussing the cooperative development of a V/STOL attack airplane. The discussions are in an advanced stage, and it appears that a joint development will be attempted. Reports are that engineering work will be conducted in all three countries instead of in one—as was done in jointly funded development of the P.1127 and its BS-53 engine.

The obvious intent of all three nations is to get more for their military research-and-development dollar. If this is to be achieved in practice, a vastly improved management setup will be needed. A great percentage of US R&D funds now are nonproductive in that they are expended in the review of projects within the military services and the Office of the Secretary of Defense. If the full apparatus of two other governments are added to this "overhead," it is entirely possible that no savings will result. And such an addition may enlarge the design "committee" to the point that timely, objective technical decisions may be impossible.

If the V/STOL development alliance among England, West Germany, and the United States is actually undertaken, a new order of efficient management will be required for success. And, in the long run, the insistence of the French on keeping competition alive in this field might be the only spark that could make a tri-nation development workable.—END

Lockheed XV-4A—A simple, rugged lift propulsion system is the main selling point of this 7,200-pound research aircraft. Two Pratt & Whitney JT12 turbojets, delivering about 3,000 pounds of thrust each, provide power during horizontal flight. For takeoff and landing their thrust is augmented about 30 percent by a large exhaust-driven jet pump in the fuselage. No operational tests are planned. Developmental flight tests have been in progress since July 1962. One aircraft was lost during a transition flight test in 1964. The Army has invested about $4.2 million.

Curtiss-Wright X-19—Two of these "four-propeller tandem" airplanes are being built under the DoD triservice V/STOL program. They have about the same advantages and disadvantages as the "four-duct tandem." A major difference is that the specially twisted propellers produce a significant upward lift force during cruise when they are rotated forward. Two interconnected Lycoming T-55 engines power the X-19 which takes off fully loaded at 13,000 pounds. The aircraft cruises at 300 knots and has a design payload of 2,000 pounds at a range of 425 nautical miles.

Dornier DO-31 — First of two prototypes is scheduled to fly this spring. In its final form this aircraft is to be about the size of the XC-142. England and West Germany are cooperating in the development of this aircraft which will be the first large jet-powered V/STOL transport. A range of better than 300 miles carrying an 8,000-pound payload is expected.

Dassault Balzac—A "composite" lift system, consisting of a cruise engine in the rear fuselage plus eight small lifting engines, is used in this prototype for the Mirage III-V, a 30,000-pound Mach 2, V/STOL multipurpose fighter. The Mirage III-V cruise engine will be a derivative of the TF-30 powerplant in the F-111. After many successful V/STOL flights, complete with transitions, the Balzac crashed early in 1964. First flights of the Mirage III-V are planned for first half of 1965.

VJ-101-X1—A succesful V/STOL fighter prototype flight program has been conducted with this aircraft, which was developed by Entwicklungsring Sud, a consortium of manufacturers. The basic design is the same as the Bell D-188 which was canceled by the USAF in 1958. It is powered by six 2,750-pound-thrust Rolls-Royce jets, four of which are mounted in swiveling wingtip pods. An advanced fighter of this type has been reported shelved for the present while West Germany and the United States attempt to work out a joint development program for a V/STOL fighter.

Hawker P.1127 — Development and operational flight test of this fighter has been a joint effort of England, West Germany, and the US. A single 15,200-pound-thrust Bristol Siddeley 53, a lift-cruise engine, powers this 12,400-pound aircraft. Operational tests are scheduled for a six-month period this year. A more advanced fighter of this type and capable of supersonic speeds, the P.1154, was planned by the British but canceled recently. England is discussing the possibility of further joint V/STOL developments with the US and West Germany.

NATO Defense College

The requirement for men with the special knowledge necessary to fill key positions in the North Atlantic Treaty Organization led to the establishment of a unique international college where the "cream of the crop" from the NATO countries learn about NATO, the countries that belong to it, and the problems the organization faces. Nationalistic barriers are broken down and men learn to think of the world's problems from a broader point of view. This is the view that is . . .

MOLDING INTERNATIONAL

LATER this month, students of one of the most unusual—and valuable—of the free world's defense academies will spend seventeen days in the United States. They will visit the White House; the United Nations in New York City; Norfolk, Virginia's, vast naval installations; Strike Command headquarters in Florida; SAC headquarters in Omaha; NORAD headquarters in Colorado Springs; and the McDonnell Aircraft Corp., St. Louis, Mo.

The visitors will be the "cream-of-the-crop" student body of the NATO Defense College in Paris, many of whose 1,300 alumni today fill important international assignments. Their unique multinational educational experience stirs annual alumni meetings in the majority of NATO countries, and an annual meeting of *anciens* in the French capital where they are briefed on latest Defense College developments, where they discuss NATO aims and problems, and where old friendships are renewed.

Such bonds permit both a frank discussion and a search for answers to critical problems facing NATO. At the last Paris reunion, for example, members dealt objectively with such issues as: the use of tactical nuclear weapons in Central Europe, a Cyprus solution, de Gaulle's views of the alliance and the purpose of the *force de frappe*, the value of the multilateral force, admission of Spain to NATO, trade with Cuba, and assistance to the US in Vietnam.

Four NATO Defense College students view Air Force Academy chapel during tour of Academy. The College spends twenty percent of its time on the road. Left to right, students, with escort officer, represent the US Navy, RAF, Canada's Navy, and United Kingdom's Army.

What is the environment that permits such a free exchange between Turk and Greek, German and Norwegian, American and Frenchman? Let us look at the history of the College and spend a day in its milieu.

The NATO Defense College, first school of its kind in history, welcomed an initial forty-seven students from ten nations on November 19, 1951. Its establishment was due in large measure to the efforts of Gen. Dwight D. Eisenhower. Shortly after becoming Supreme Allied Commander in Europe, General Eisenhower recognized the need to secure well-qualified officers and civilians to fill key NATO positions. In view of the differences in training and background of the alliance members, it was decided to study the desirability of establishing an international college as a source of NATO personnel.

The General summarized this study in a telegram to the NATO Standing Group on April 25, 1951: "My efforts thus far to find suitably trained staff officers for key positions on high-level NATO staffs and my discussions of NATO problems with officials associated with national and NATO agencies have convinced me that there is a high-priority requirement to develop individuals, both on the military and on the civilian side, who will have a thorough grasp of the many complicated factors which are involved in the problem of creating an adequate defense posture for the North Atlantic Treaty area. . . . These considerations have brought me to the conclusion that it is highly desirable to establish in the near future a NATO Defense College for the training of individuals who will be needed to serve in key capacities in NATO Organizations."

The decision to create the College was approved by the then twelve NATO governments in June of

By Col. Richard J. Stillman, USA

LEADERS

1951. Instructors and staff were selected primarily from France, Britain, and the United States with funds obtained from the ever-reluctant national budgets. France came forward with the gift of a wing at the Ecole Militaire—cradle of French military learning. In this building had trod her greatest leaders, from Napoleon to de Gaulle.

Paris was an ideal choice for the site of the College. That city already accommodated the North Atlantic Council, SHAPE, and other agencies with which close liaison would have to be maintained. Outstanding speakers were available. Cultural advantages were unlimited. After some rapid and ingenious reconstruction by the French Army Engineers, the College opened with an impressive ceremony highlighted by a welcome from the Premier of France.

General Eisenhower, discussing the organization of the College, said:

"The course might include a study of military, political, and economic factors which influence our NATO defense efforts, as well as a consideration of specific problems in both the military and the political fields for which satisfactory solutions may not yet have been found."

These views were translated by the Standing Group into a specific mission, which presently requires the commandant to train selected personnel in four areas:

- Organization and aims of the North Atlantic Treaty and major factors involved in NATO defense.
- Organization and working of NATO bodies and staffs.
- Problems concerning the preparation and conduct of NATO forces for war.
- Language comprehension of French or English according to the needs of the individual faculty officers and members.

Lt. Gen. Graf von Baudissin, Commandant of the NATO Defense College, presents a diploma to Col. Julian W. Parker at the graduation ceremony of the twenty-fifth class in July 1964. The colonel is presently the US Military representative at SHAPE.

The College is often mistaken for an element of Supreme Headquarters, Allied Powers in Europe (SHAPE). However, its immediate superior, like SHAPE and other Atlantic alliance commands or agencies, is the Standing Group in Washington, D. C. The Standing Group Terms of Reference, August 29, 1957, states: "The College will be under over-all direction of the Military Committee exercising executive control through the Standing Group." The Standing Group is composed of representatives of the Chiefs of Staff of France, the United Kingdom, and the United States. It is the executive agent of the NATO Military Committee, and is the superior body responsible for the highest strategic guidance in areas in which allied NATO forces operate.

The organization of the College reflects the fact that multinational organizations need a larger staff and more rank than similar national schools. A commandant (lieutenant general), four deputies (of brigadier and major general rank), and twelve faculty members (colonel rank) are available to support fifty-four students. Student strength is based upon average class attendance during the past thirteen years. Three deputies come from Standing Group nations; the fourth is on a rotational basis from other NATO countries. In addition, administrative, messing, and other services require a permanent staff of 125 persons plus ten part-time language instructors. Although the faculty gives some instructions in its specialties, the College draws on outside lecturers to provide the majority of conferences.

Let's visit the Ecole Militaire for a sample day at the College. Diplomats and senior officers from thirteen countries (the first course had individuals from only ten countries) converge each morning by subway, bus, car, or train. Approaching the building, landmarks of Paris greet their eyes—the Eiffel Tower, Champ-de-Mars, Napoleon's Tomb, the Swiss Village, statues of Foch and Joffre.

"*Bonjour, mon Colonel*" welcomes an arriving officer as he is saluted at the entryway by the two smartly attired members of the French *garde republicain*. The venerable building presently houses the seven French Armed Forces schools. It has a rich tradition. Here, more than 200 years earlier, a French Army contractor conceived a plan for the education of officers in an institution which would receive young noblemen and turn them into skilled officers of the Crown. Although Louis XV granted a royal charter, he provided no funds. However, his illustrious mistress, Madame de Pompadour, came forth with moneys from her private purse to assist in its support. In 1784 Napoleon Bonaparte arrived at the Ecole and upon graduation his report said in part: "Will go far if circumstances permit."

Structurally, the edifice remains essentially unchanged from its earliest days. Yet spiritually, it is

(*Continued on following page*)

Gen. Lyman L. Lemnitzer, Supreme Allied Commander, Europe, for NATO, is welcomed by the *garde republicain* at the NATO Defense College. General Lemnitzer attended the opening ceremonies for the twenty-sixth course last fall.

witness to a transition from military service rendered to the French sovereign, to service to the nation after the French revolution of 1789, and now to the philosophy of NATO—international cooperation in matters of common interest.

At the NATO College, this objective of better international understanding begins upon arrival each morning. Hour-long language classes in French and English foster improved communication as well as cultural appreciation. Skills may vary from rudimentary knowledge to almost complete mastery.

The seriousness of the NATO language problem was commented upon by a German newspaper correspondent, Dr. Arthur Rosenberg of the *Allegemeine Zeitung:* ". . . the American Commandant . . . was expecting me. . . . The General's closest collaborators were sitting with him at coffee in his office—two British generals, a French admiral. . . . The crucial question was, of course, language. The English and American officers had learned French and German, but regretted they had forgotten it. The French admiral was not sure of his English. But one can smile in any language—English, French, or German. So they smiled with great good nature as if trying to make up for an inadequate knowledge of languages.

"The situation is just the same in the high NATO Army commands where there is often a great lack of knowledge of languages, since selection for higher commands are made on grounds of military and technical capacity. I remember, however, being told by the French General Koenig, who comes from Alsace, that his objection to any integrated army was that failure to understand each other's language would be a grave danger at decisive moments."

Although a coffee break at 10:15 a.m. closes the official language efforts, there are day-long opportunities for making progress in both official NATO tongues—French and English. This forced education especially affects the more than half of the student body that comes from other than French- or English-speaking nations. They must of necessity speak, write, or listen in a foreign language during most of their five months in attendance.

This day finds the Commandant introducing Wolfgang Leonhard, a one-time Communist leader who broke with the Party and has become a foremost speaker and writer on communism. He gives a dynamic picture of "Soviet Ideology Inside Communist Countries." After the fifty-minute presentation the students are sufficiently stimulated to ask many questions. A frank exchange prevails well beyond the noon hour. The off-the-record guarantee permits discussion of delicate issues.

Lunchtime in Paris is always a treat—the College is no exception. The mess is under jurisdiction of the French Navy, and the bar is opened with gusto immediately after class. Students and faculty sit at tables of six, and every effort is made to mix nationalities. At the Commandant's table the speaker and seven or eight students may be seated. The questions may last throughout the luncheon. After fruit, cheese, and coffee, the speaker is bid adieu and the students return slowly to their committee rooms. A graduate assigned to SHAPE remarked: "Most importantly the College taught me to always wait until after lunch to staff a paper with my European associates—it sure works."

Afternoon study revolves around discussion of key problems relating to NATO. The class is divided into seven groups. Membership in each committee of eight normally finds two civilians and six military representing Army, Navy, and Air Force with never more than two people from the same country. This arrangement lasts for six weeks and then new groupings occur on two other occasions. Participation by students is dependent in some measure on leadership of the committee chairman and counsel of the faculty adviser. However, shyness fades as friendships develop and language skills improve.

By the final segment (the last seven weeks) much has been gained from an honest exchange of views on critical NATO issues. During this last period each committee is required to give an oral presentation and write a paper, not to exceed twenty pages, on "The Future of NATO." Political, economic, and military aspects are discussed—the most urgent problems facing the Alliance are dealt with objectively. The best reports are sent to the Secretary General, North Atlantic Council, where it is hoped a seed or two may be planted for future flowering.

The official day draws to a close with the showing of a film pertinent to NATO. The building is vacated shortly after 6:00 p.m. as the members return to their hotels, apartments, and houses in Paris and the surrounding communities. After-hour associations are normally by nationalities. Reading assignments are light by normal standards, but for those not fluent in French or English it requires long after-duty hours to keep up—some do; others can't.

Informal gatherings occur each Saturday when visits are made to such French cultural areas as the Louvre, Malmaison, Versailles, Fontainebleau, and Chartres. There is a trip to the wine country. Parties of both an official and social nature are given on an average of twice a week. Each country has an affair that reflects its customs and traditions—Americans

have utilized picnics and given parties on Thanksgiving Day and the Fourth of July. Early in the course small committee "icebreakers" are frequently given at home by faculty advisers.

The College spends twenty percent of its time on the road. These travels to the NATO countries in Europe are considered by students as the most valuable part of their schooling. Here in the capitals of Europe lectures on political, military, and economic questions are given. Where feasible, students are given a country-appreciation orientation in addition to observing such NATO demonstrations as a naval

Maj. Gen. Robert H. Warren, Superintendent of the Air Force Academy, speaks to the twenty-third class of the NATO Defense College while it was visiting the USAF Academy in 1963. Students include civilians and officers.

show in the Mediterranean by the Sixth Fleet, a ground forces display at Grafenwohr by the Central Army Group, or an air performance by the Fourth Allied Tactical Air Force at Ramstein.

President Kennedy provided the high point of a most memorable experience for the class that visited North America. This was only the second time in thirteen years that the College had an opportunity to cross the Atlantic. The impact was perhaps best summed up by a French student, Augustin Alline: ". . . John F. Kennedy appeared, made a short speech, walked down the steps of his veranda, shook hands, and said a few words to some of us. . . . We will remember that his Irish heritage, his years of study in London, and the breadth of his vision enhanced his understanding of the problems of Europe. To this great American President, the Atlantic Alliance appeared as an essential factor to the security of the free world."

The vast difference between our national military institutions and the NATO Defense College is that at our own schools we see only a slice of each problem of the Alliance from an American viewpoint. The NATO Defense College provides a platform not only for obtaining each national philosophy but also for using the impact of these interrelationships and interactions in reaching solutions. In such a multinational institution, this honest exchange provides a unique opportunity to really understand other views.

The late President John F. Kennedy talked to the twenty-third class of the NATO Defense College while it was visiting the US. It was the second class to visit the US since the College began. The third is to visit later this month.

How does an Air Force officer get selected for this NATO Defense College assignment? The College Commandant states his desires in a letter to all governments: "I cannot emphasize too strongly the necessity of designating outstanding members for the course." He encloses Standing Group Policy Guidance on the subject:

"Students will be officers and civilian officials of NATO countries whose home governments consider them particularly qualified in temperament, education, professional background, and experience for future high NATO posts or NATO-related positions. These qualifications should be generally comparable to the entrance and retainability criteria established for enrollment in national defense colleges (or comparable institutions) operated by national governments. In addition, students should possess a basic knowledge of either English or French sufficient to effectively participate in the college program from the beginning of courses."

Each nation (and service therein) interprets these instructions somewhat differently, based on its own requirements and availabilities. USAF is authorized only two spaces within each class. An officer must be in the grade of colonel and, in the language of a personnel chief, "be a topnotch file."

Competition in the Air Force is keen for this Paris assignment that is normally followed by a European tour of duty in a NATO billet. And the competition is understandable.—END

The author, Robert J. Stillman, a US Army Infantry colonel, is Policy Planning Officer in the Office of the Assistant Secretary of Defense for International Security Affairs. He was a student and later was on the faculty of the NATO Defense College from 1960 to 1963. A frequent contributor to service publications, he is the recent author of "Practice of Flabbiness: Preaching of Fitness" for Army. *His book,* The U.S. Infantry —Queen of Battle, *will be published this year. A Harvard Business School graduate, he teaches a course in investments at George Washington University, Washington, D. C.*

In the light of recent developments in the Far East that have resulted in a stepped-up tempo to the war in Vietnam, the action described in this article may become a model for future operations against the Viet Cong who, by striking in greater numbers, thereby make themselves more vulnerable to counterattack by air. The writer outlines the way a two-battalion Viet Cong force was smashed late last year by a combination of Army and Air Force helicopters and prop aircraft in . . .

THE BATTLE OF LONG MY:

By Kenneth Sams

FOR THE insurgent in any guerrilla war, success depends upon how well he is able to cancel out his opponent's technical superiority. If he can force his opponent to fight on his terms, using his weapons, his battle is won. The war then becomes one of ambush, hit-and-run strikes, attacks on outposts at night, sabotage of trains and installations. The insurgent has the advantage because he can conceal himself in a countryside he knows well and pick a time and place of battle.

For the counterinsurgent, the opposite is true. Unless he can find and destroy the enemy in his own environment, with superior weaponry, there can be no victory. This is the central issue in the military phase of the war in Vietnam.

A day-long battle last December in the flat delta land of Chuong Thien Province about 110 miles south of Saigon shows what coordinated air activity can do to an enemy who is committing larger and larger forces to action of his own choosing.

On that one day, eighteen Vietnamese Air Force A-1E and A-1H Skyraiders teamed up with US Army helicopters to decisively smash an enemy who had committed two battalions in three separate attacks on government installations. Before nightfall, an estimated 400 Viet Cong (VC) lay dead in the rice paddies, banana groves, and mangrove swamps. Even more important, the air strikes, according to US Army advisers and Vietnamese ground commanders, averted what could have been a major disaster.

The day started peacefully enough. At about 9:00 a.m., Maj. Asa N. Chandler, USA, of Cambridge, Md., adviser to Vietnam's 21st Infantry Division, was moving eastward along a dirt road with two Regional Force companies, part of the Vietnamese "militia." Their mission was to deliver a 155-mm. howitzer to an outpost about eight kilometers south of the district capital of Long My, a town comparable to a county seat in the US. The outpost had been attacked by the enemy the previous night, and the powerful artillery piece would help them fight off future attacks.

About 1,000 feet overhead, in a light liaison O-1F plane, USAF Capt. Stanton R. Musser of Gettysburg, Pa., with his Vietnamese observer, was patrolling the route the two companies would follow, looking for signs of the enemy, especially anything that would indicate an ambush.

The two Regional Force companies were moving on a road that runs, most of the way, along a major canal.

Here a USAF O-1F, of the same type flown by Captain Musser during the battle of Long My, escorts a motor convoy. From such a light liaison plane Captain Musser directed air action for over ten hours, stopping only to refuel.

Capt. Stanton R. Musser of Gettysburg, Pa., is shown here in front of an O-1F aircraft, the type he flew in the battle of Long My in December. Based at Ca Mau on the southernmost tip of Vietnam, Captain Musser flew as a forward air controller in Vietnam from September 1964 to January 1965 on temporary-duty status. He is regularly assigned as an F-100 pilot at Homestead AFB, Fla. For the Long My battle, he received the Vietnamese Cross of Gallantry with Palm Leaf.

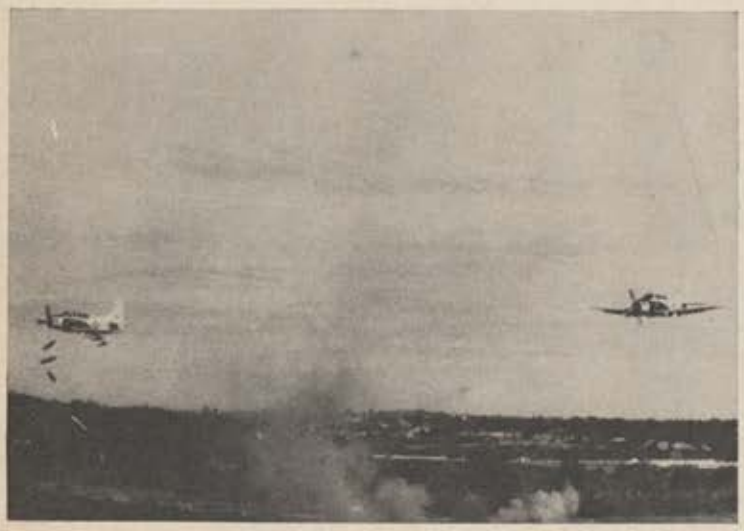
AIR SUPPORT IN ACTION

The road and the canal are intersected every couple of kilometers by smaller canals.

Major Chandler, fearing an ambush not far from Long My, asked the O-1F to take a look. Captain Musser and his VNAF observer dropped to a lower altitude, but found nothing unusual. The lead company moved forward.

Four VNAF Skyraiders, flying overhead as air cover, were ready to strike if the enemy showed himself. The A-1E pilots were tuned in to Paddy Control, radar control for the delta. Paddy Control was also in contact with Captain Musser.

By 11:30 a.m., the lead company had moved to within five kilometers of its destination. The Skyraiders, low on fuel, would soon have to return to base. Then, just a few hundred yards east of the ground force, Captain Musser spotted some sampans sunk in the canal, a VC tactic for hiding these supply vessels. He also saw what looked like foxholes, but he couldn't be sure. Dropping down below 500 feet, he flew over the suspected area. He drew no fire but knew that if a main force VC unit *were* hiding below, it wouldn't fire at his liaison plane, for an observation plane means fighters are close by.



Vietnamese Air Force A-1E Skyraiders, guided by forward air controllers, blast an enemy Viet Cong target. They are directed by radio contact with the FAC team just as Captain Musser directed his Skyraiders during the Long My battle.

Musser reported to Major Chandler, who replied that he saw no signs of VC activity on the ground. Just to be safe, he asked Musser's observer to fire a rocket smoke marker into the suspected area, a tributary canal which lay just ahead of the lead company.

Musser described what happened next. "We rolled in and marked the target with a smoke rocket and, Boy! as soon as the smoke came, everything busted wide open. Fire from .50-caliber machine guns came reaching into the sky, and we could see a string of muzzle blasts all along the canal. We had stepped on a rattler."

Almost immediately, Musser was directing the four A-1Es in strikes against the VC concentration, and in ten minutes of bombing the enemy ranks were shattered. With Musser calling the shots, the Skyraiders dropped 18,000 pounds of napalm and high-explosive bombs onto the enemy positions. "It was a beautiful job of precision bombing," Musser said. He counted thirty-five dead on the ground, "but there must have been a lot more." The A-1Es returned to base.

Taking advantage of the VC confusion, Chandler joined his lead company in pursuit of the VCs. The unit moved past the enemy bodies, picking up weap-

(Continued on following page)

ons and searching for survivors. At first, it looked as though the air strike had done the trick. But unknown to both Chandler and Musser, the main force of the VC battalion was on the west side of the canal about 100 yards away. During the bombing strikes they had lain low, waiting for the right time.

Suddenly the enemy opened up with small arms, automatic weapons, and 57-mm. recoilless rifles. The small force with Chandler was getting fire from several directions. The second of the two companies retreated toward Long My with the 155-mm. howitzer to make sure at all costs that it was kept out of the enemy hands. In the confusion of the battle which followed, Chandler soon found himself with only fourteen men left from the lead company.

Chandler and the fourteen soldiers took cover in an abandoned triangular fort which they had passed earlier, and jumped into trenches running from each corner to the center. The fort had fifty-foot sides with a five-foot-high earth mound on the perimeter. It wasn't much protection, but the best available.

As the VCs prepared to move on the fort, Chandler radioed for more air support. He estimated they could hold out for ten minutes.

In the air about forty miles north were four more A-1Es, scheduled for a routine air-cover mission. The planes, with a full load of napalm and bombs aboard, were diverted to support the outpost defenders. Musser, told it would take twenty minutes for the planes to arrive over the target, called on six armed US Army UH-1B helicopters, sent up from the nearby base of Soc Trang, to help hold off the enemy until the fighters arrived. The helicopters, flying against heavy antiaircraft fire, launched 2.75-inch rockets and machine-gun fire into the enemy positions, but the well-dug-in guerrillas were able to withstand the attacks.

Fortunately, the A-1E flight arrived on the scene in twelve minutes—well ahead of its estimated time. Musser thanked the chopper pilots and told them to clear the area for air strikes. Then, like a quarterback calling the plays, he directed the A-1Es on individual runs against targets.

"I'm putting a rocket on the first target," Musser radioed. "It's a row of huts across the main canal west of the outpost. Watch for it."

Musser put the lightplane into a dive and fired the rocket. The yellow smoke was clearly visible to Maj. William G. Plunk of Bethel Springs, Tenn., instructor pilot in the first A-1E.

Since the area was clear of civilians, the strike pilots had permission to hit anything within 100 feet except the outpost itself. Plunk's trainee pilot put the sturdy aircraft into a dive and slammed several 500-pound bombs right on the target.

"Perfect," Musser yelled. "Now, just north of the small canal. A banana patch and two rows of houses. All filled with VCs."

Capt. Walter L. Dixon of Opelika, Ala., and his student pilot came in low from the north, parallel with the huts, and, when their 250- and 500-pound bombs hit, the target area disappeared in clouds of smoke and dust, marked here and there by tongues of flame.

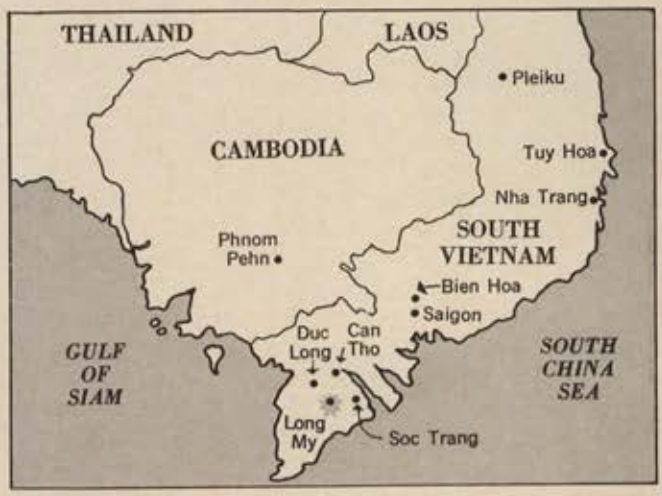
The other two American pilots, Capt. Thomas A. Johnson from North Manchester, Ind., and Capt. William H. May of Bakersfield, Calif., each with a VNAF pilot, also unloaded their weapons on the enemy. The strike by Johnson's A-1E was made just over the fort. Napalm dropped so close that the heat singed Chandler's eyebrows. But it had to be that way. The bombs landed on the enemy guerrillas who were on the same side of the canal as the fort. Johnson's plane was hit twice, once at fifty feet and again at 2,500 feet. But it limped safely into an auxiliary field at Can Tho (*see map, below*).

A total of nine strikes was made on enemy forces all around the fort. The whole exchange lasted only ten minutes and Chandler and his Vietnamese cohorts were able to walk out, moving north again to find the second company. The aircraft returned to their base at Bien Hoa.

But though the Skyraiders had shattered the VC positions around the fort leaving more than a hundred dead, this was not to be the end of the battle. The VC force which had surrounded the fort was only an element of two full battalions massed against the government forces in Long My.

While the fight was in progress, a truck convoy had been dispatched by the Chuong Thien Province Chief to go from Vi Thanh to Long My to help the ambushed unit. About eight kilometers from the fort, it was ambushed in classic VC fashion, the lead and rear trucks being hit. The burning convoy was reported to Musser by a radio operator stationed at the Duc Long outpost, located about ten miles away, which was also under attack.

Since morning, Musser had been in frequent contact with an Army L-19 radio relay plane, piloted by 2d Lt. Robert D. Thorton of Vicksburg, Miss., who was directing supporting artillery strikes. The Army pilot and his Vietnamese observer went to look for the convoy while Musser flew cover over Chandler's unit. When Lieutenant Thorton found the burning convoy



Above is a map of the lower half of Vietnam showing the places that have figured prominently in recent Viet Cong attacks on US installations as well as the areas mentioned in the battle of Long My. Note Long My is well below Saigon, showing lack of battle lines in this strange war.

In a situation very similar to the one during the first contact with the enemy during the battle of Long My, this series of strike photos show napalm rolling over some huts beside a canal in Vietnam. In the Long My battle, Captain Musser directed four A-1Es against a Viet Cong concentration which he had located by passing low and drawing their fire. With Chandler and his company of Vietnamese pinned down in an old fort, the A-1Es, under Musser's direction, dropped 18,000 pounds of napalm and high-explosive bombs between the canal and the fort in a ten-minute period.

on the road, he called Paddy Control for air support.

Again, armed Hueys attacked the enemy around the convoy until the third flight of A-1Es arrived. Musser learned from a radio operator at Duc Long outpost that the Vietnamese were north of the convoy. Enemy fire was coming from the south. That's where the bombs would go.

Musser directed these four aircraft as he had the others, placing their weapons on three canals where the enemy was entrenched with heavy weapons, including 57-mm. recoilless rifles. A-1E aircraft, facing intense ground fire, took several hits, but their strikes, plus the armed Huey attacks, saved what was left of the convoy. After some 20,000 pounds of napalm and bombs had been dropped, numerous enemy bodies were visible.

Still the battle went on. Two VNAF A-1Hs, directed to cover Major Chandler's company moving north to join the rest of his troops, attacked more enemy forces armed with several .50-caliber machine guns. One A-1H was shot down and landed in a rice paddy, but an armed chopper called to the scene by Musser rescued the pilot, under withering enemy fire. Because the VCs controlled the area where the plane went down, an explosive ordnance destruction (EOD) team, assigned to destroy the plane before it fell into VC hands, couldn't reach it. The enemy, armed with .50-caliber machine guns and recoilless rifles, also had Chandler's unit pinned down. Again, air strikes were needed.

Another flight of four powerful A-1Es was called in, each capable of carrying the bomb load carried by a B-17 in World War II. Their target was the VC concentration around the downed plane. The planes were over the target at 6:20 p.m. and by 6:30 had dropped some 6,000 pounds of bombs on the enemy. The VC machine guns were knocked out and the enemy withdrew. Once again, although the attacking planes received several .50-caliber hits, they had cleared an opening for Chandler's group.

Captain Musser and his Vietnamese colleague had been directing the air action for ten hours and five minutes, stopping only for ten-minute intervals to land and refuel the plane. It was a good day's work. In all, the air strikes they directed had accounted for approximately 400 VCs killed. They had saved the company Chandler was with, and they had saved the attacked convoy from being wiped out.

Later that night, flare ships and fighters covered the convoy and kept the VC away from the downed plane. The next morning, an EOD team reached the area to blow up the aircraft. Also at dawn a relief force arrived to escort the surviving members of the convoy to safety.

This was one day in the air war over the flat delta land of Vietnam. Eighteen single-engine prop planes plus US Army Hueys, guided by an American liaison pilot and his observer, were able to cope with a highly confused battle situation. "The enemy seemed to pop up everywhere," Musser said. "I just don't see how we could have averted disaster except through airpower."

Both Vietnamese ground commanders and US Army advisers backed up this opinion. The close support by Skyraiders, involving in many cases the dropping of bomb loads within 100 feet of friendly positions, was a tribute to the highly skilled pilots of the USAF and the VNAF.

The experience at Long My also showed how armed helicopters and the more powerful Skyraiders can work together. At practically all times, there were either armed UH-1B helicopters or Skyraiders on call over the battlefield, the Hueys keeping the enemy at bay until the more heavily armed Skyraiders could reach the scene.

As a result of timely and highly effective air action, the enemy paid heavily at Long My. In a sense, the incidents at Long My are a portent of the future. If it masses battalion-size units for large-scale attacks, the Viet Cong will become more discernible and more vulnerable. When this happens, fighter aircraft can be employed even more effectively than they have been until now, surface engagements having been limited, in the main, to sporadic acts of terrorism by relatively small units.—END

Living on a small, cold, snowy, lonely island off the coast of Alaska, or atop a peak on that island even more cold, snowy, and lonely, is not exactly heroic—at least not in the fiction-hero sense. This artist-writer, invited to tour a typical AC&W remote site as part of the USAF Art Program, portrays men accepting boredom and even real danger, at times, with a kind of courage we've not yet found a satisfactory name for . . .

REMOTE SITE LIFE

By Howard Brodie

ILLUSTRATIONS BY THE AUTHOR

The tram was an open platform, with a safety rail around it, suspended from cables which ran in long sagging arcs from supporting tower to tower up the steep slope of the peak. The tram car was very unsteady, swaying and moving jerkily forward. It seemed very high as I looked down.

I FELT the cold in my legs when I stepped off the plane at the remote AC&W (aircraft control and warning) site of Northeast Cape on St. Lawrence Island. The site is in the Bering Sea off the coast of Alaska at Nome and less than fifty miles from the coast of the USSR. This is typical of many such sites that are part of the US air-defense system. They form an interlocking chain of radar around the northern reaches of the continent, and their reports control the actions of thousands of fighter-interceptors and air-defense missiles.

I was wearing an issue parka, but my thermal "long johns" were still stuffed in my duffle bag. The Air Force had issued me full winter gear after inviting me to visit the Alaskan Air Command as an artist to participate in the USAF Art Program, which encourages professional artists to paint Air Force subjects.

After the site commander warmly greeted me, we drove the couple of miles from the airstrip by the sea to the site, below a group of mountains.

"I had the 'Big Eye' last night," said the colonel, who was due to return stateside. "Couldn't sleep well," he went on. He explained that this happened to many men when their twelve-month tour of remote duty was nearing its end.

I don't know what I had expected a site to be—Quonset huts, perhaps, connected by an underground ice tunnel. I certainly didn't expect modern steam-heated buildings housing all the facilities of an Air Force base in miniature and all connected by warm hallways. "Yes," I was told, "an AC&W site has all the conveniences—except women."

Time was the constant topic of conversation: You were a "hung jeep" or a "lifer" when you first arrived with 365 days to go, a "skater" when you were midway, and you suffered from the "two-digit fidget" when your days dropped below 100. You were given a crazy hat to wear, or a whistle to blow, when you were a "short timer."

"Shrinking clothes" was a universal complaint as good chow and little physical activity added pounds to the midsection. I also observed a universal pallor —even though there were sun lamps—from the long periods indoors.

From some of the hallway windows—when they aren't covered with snow—you can see the radar dome on one of the mountains above the site. About a dozen airmen stay for a year on this mountaintop, connected to the lower site only by the tramway. Fog covered the rocky, snowy mountaintop; three black ravens circled it and white foxes ate food scraps nearby.

The community was home and office, school and recreation ground. Airmen wore uniforms on duty, civilian clothes, off. One sergeant grew plants on the windowsill of his bedroom. Some airmen studied college extension courses, others fashioned jewelry in the hobby shop. There was an active sports program in the gym.

From some of the hallway windows—when they aren't covered with snow—you can see the radar dome on one of the mountains above the site. About a dozen airmen stay for a year on this mountaintop, connected to the lower site only by a tramway.

The day after I arrived, I put on my "long johns," two sweaters, overshoes, and a parka, and joined a lieutenant and a chaplain en route to the dome. Alaskan Air Command chaplains are modern circuit riders, using Air Force, commercial, or bush planes to complete their round of several sites each month.

Driving to the tram we passed big screen-like structures that looked like drive-in theater screens faced with blackish-green panels. They are part of the "White Alice" system, which bounces radio signals off the upper atmosphere and over the horizon in 200-mile leaps, to lick the atmospheric-interference problem which plays havoc with normal radio signals in Arctic regions.

"Don't stand in front of those screens or you may become sterile," I was told. There were warning signs surrounding the screens.

The tram was an open platform, with a safety rail around it, suspended from cables which ran in long sagging arcs from supporting tower to tower up the steep slope of the peak. It was loaded with supplies. We started, passing the first tower and the second. The tram car was very unsteady, swaying and moving jerkily forward. It was also very high.

"We have emergency brakes," the lieutenant said, "but if a side cable breaks we're out of luck." The wind increased as we climbed. "We can't run the tram if the wind blows over fifty miles an hour," the lieutenant told me, "because the tram sways too much." Higher we climbed—I could feel it getting colder. The cables were covered with hoarfrost and rose at a steeper angle. We reached the end of the tramway, and I felt, with relief, an unmoving surface under my feet. On a rocky ridge still above us was the radar dome; three black ravens circled around it.

(Continued on following page)

In a darkened room, airmen focused on the radar screens in the dim blue cast, broken only by illuminated buttons glowing with an orange light alongside the screens. They guarded to give early warning of approaching unidentified aircraft.

We entered a passageway, enclosed with boards against the wind, up the steep ridge. There was a sign: "NOTICE: THE FOLLOWING CLIMB IS NOT RECOMMENDED FOR THE FAINT OF HEART, WEAK OF KNEE, OR DOUBTFUL OF MIND." There were wooden cleats nailed to the flooring at intervals for better footing. At the door to the dome we came outside for a moment. Fog covered the rocky, snowy mountaintop. We were at the remote, remote site. An airman opened a door, holding a crossbar in his hands. "The winds would blow the door off without the bar," he said. "We had 120-mph winds three weeks ago—blew off the roof of the tram shed and the catwalk around the dome."

We entered a homey, comfortable, combination kitchen-dining room with a modern kitchen sink, cabinets, stove, two dining tables, a record player, two refrigerators, and a frozen-food locker (with trade name Sub Zero), on which sat a TV set. Outside, Arctic winds blew, and through the window I watched two white foxes nibble food scraps put out for them by the airmen.

A chaplain joined us on the tramway to the dome. Alaskan Air Force chaplains are modern circuit riders, using Air Force, commercial, or bush aircraft, to complete circuit of several aircraft control and warning sites each month.

The cook, Tom Little, was dancing the "Mashed Potato" to a Beatle recording, as he mashed potatoes. The airmen came in from the dome for dinner. "We picked up five Russian planes on the radar," one said, "but they were inside their corridor—no sweat."

I was assigned a bed in the dormitory. On the foot of each bed is an Arctic survival pack, in case some emergency forced exposure to the elements. Alaskan winters are respected. "White-out" alerts warn airmen to stay indoors, for a man can get lost within feet of safety in the blinding storms. On a dormitory wall was a screen, on which a new motion picture is shown each night.

Word came up that the tram was arriving with water and mail. Airmen hovered around the mail sack to receive their letters and hometown papers. One airman received a summary of his bills, another photos of eligible women from a lonely-hearts club.

In the morning the dome was lost in the mist of the mountaintop. The white foxes came back, and the ravens circled again. You could only splash yourself with water from the bathroom sink for showers are limited to one a week with the scarcity of water on topside. Yet, a number of these airmen told me they would not trade their isolated duty to work below.

I went below in the tram, down through the snowy mist and stinging, howling wind, learning that it was best to put the back of your head to the wind.

In the heart of operations at the base camp, I saw how the information from the dome is channeled. Here, in a darkened room, airmen focused on the radar screens in the dim blue cast, broken only by illuminated buttons glowing with an orange light alongside the screens.

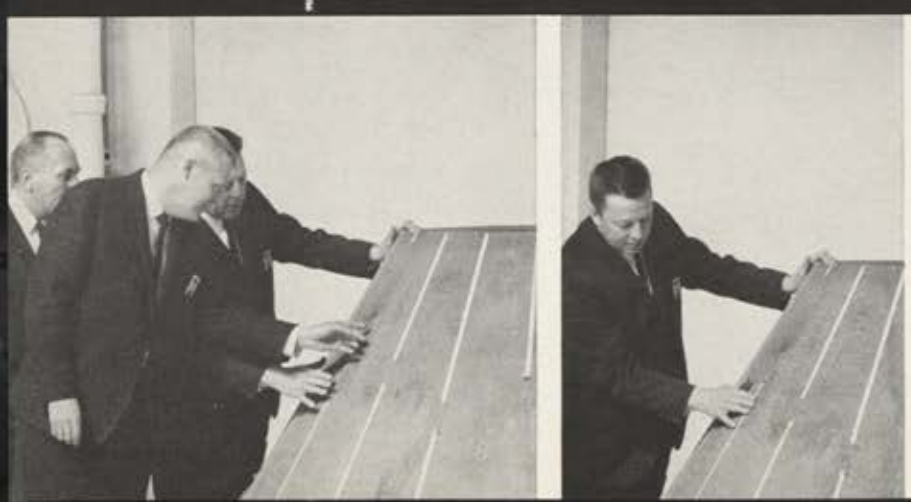
I went out into the hallway and passed a telephone where, by special arrangement, airmen can call home. And the next day I headed for home. As the colonel drove me to the airstrip, snow was falling. "That's rotation dust," he said.—END

Apollo Re-entry

From materials research to heat-shield fabrication—
At Avco/RAD the job only begins with research. Our scientists solved the problem of finding materials which could travel for weeks in the deep cold of outer space, then survive the tremendous heat and pressure generated by 25,000 mile-an-hour re-entry. But North American Aviation's assignment to Avco/RAD didn't end with research. We are also designing and manufacturing the unique Apollo Command Module thermal protection system upon which will depend the lives of the first three Americans returning from the moon. Furthermore, this concept-to-hardware process is guided by a veteran program-management team meeting tight cost and schedule requirements. Having capabilities like this "under one roof" is what we mean when we say: *Avco/RAD is an integrated research and development organization.*

AVCO/RAD

AVCO CORPORATION/RESEARCH AND ADVANCED DEVELOPMENT DIVISION/WILMINGTON, MASSACHUSETTS



THE SPACE AGE IN PERSPECTIVE

SPACE DIGEST

VOLUME 8, NUMBER 3 • MARCH 1965

Criteria for a Rational Space Program
By J. R. Dempsey 43

Beyond the accepted goal of national prestige, the space effort must be recognized for what it is—a valuable research program whose payoffs cannot all be foreseen.

USAF's Wide-Ranging Aerospace Medical Division
A SPACE DIGEST *Photo Report* 48

Exploring the frontiers of space medicine, supporting NASA's requirements, training tomorrow's flight surgeons, ensuring crew survival in extreme environments, preparing for MOL . . . these are just some of AMD's major space-age assignments.

Higher Education for the Space Age
By Logan Wilson 52

Tomorrow's colleges and universities will be more than just a bigger version of today's, scaled up to meet increased population. The demands on higher education will be heavier and more varied than today.

Speaking of Space
By William Leavitt 58

The long hiatus in US manned spaceflight will soon end with the first Gemini flight, which presents a good opportunity to retrace our steps since the day the Mercury Astronauts were announced.

Beyond the acknowledged goal of national prestige, it is vital that our national space effort be recognized for what it is now, in its early historical phase: a highly valuable research program the later payoffs of which we cannot really foresee now. This means orderly development of hardware, based on the modular approach, so that today's missions can lead naturally, saving costs and time, to tomorrow's efforts. This is just one of the . . .

Criteria for a Rational Space Program

BY J. R. DEMPSEY

IN AN earlier day, national prestige was achieved by such things as a favorable balance of trade, winning the international seaplane races, World Fairs, and cruises of naval fleets to "show the flag" in world ports.

In our time of cold war, more sophisticated events are required, such as putting our astronauts into space.

These explorations, aside from their great scientific value, offer the world tangible evidence of American vitality and purpose—especially since they are conducted openly, literally before the eyes of the entire world.

And, of course, such events generate upwellings of national pride, sense of purpose, and unity which are heartwarming to all Americans.

For all these reasons I believe that we will continue to see a reasonable share of our national budget earmarked for astronautics.

Presently we are allocating only about one percent of our gross national product for astronautical activities, mainly in the budgets of NASA and the military services.

There has been some alarm over the recent reluctance of Congress to appropriate these funds as freely as it did at the birth of astronautics.

I think this reluctance was to be expected, for the novelty of astronautical activities at the outset—and their relationship to the cold war—created a national openhandedness which could not reasonably be expected to continue over a long period.

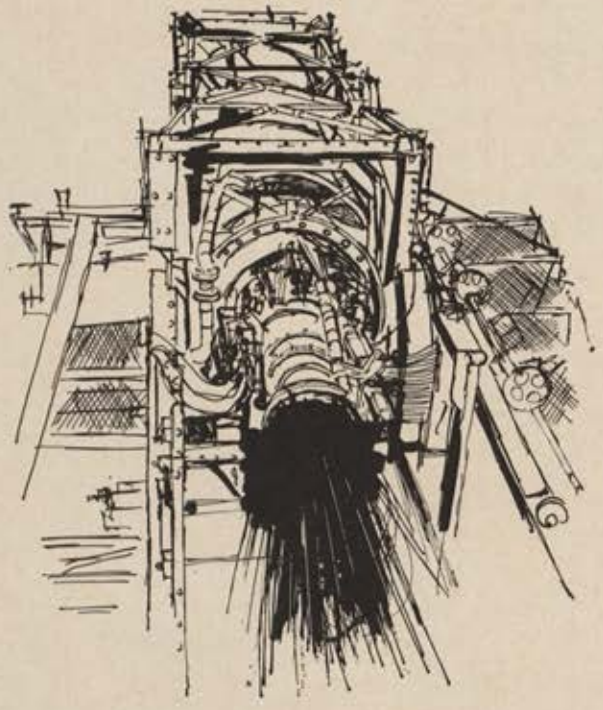
But I expect to see a continuing, substantial allocation of federal funds for astronautical projects—averaging out, over the long term, at perhaps a little less than one percent of gross national product, with occasional spikes in the curve which result from geopolitical events. One cannot predict just when these will occur, any more than he could have predicted those of the past.

Now a continuum of funding presents those of us working in astronautics with an opportunity for continuing progress; but it also places a responsibility on us to plan our projects and programs much more carefully than we have been able to do in the few short years since astronautics arrived. And I think such discipline is proper and healthy. It is much more susceptible to a logical engineering approach.

Military projects focus now on the [Air Force] Manned Orbiting Laboratory, and the findings of that program will have a fundamental effect on further undertakings.

However, it may be a mistake to discriminate between military and nonmilitary astronautical projects in the longer view, for certainly no person now can say just what applications will be found for the various space vehicles and space data of the future.

Of course, today's rockets are very impressive to look at, but they are as crude for accomplish-



ing their mission as the early steamships, automobiles, and airplanes.

The phase we are now entering in the evolution of rockets is to make them reliable and economical. This will be done in the same manner as for airplanes and earlier transportation systems, *i.e.*, repetitive reuse with a consequent buildup in our body of knowledge in how to design, build, and maintain them.

In the process of doing this, we will find our points of view changing, as we experience new situations for the first time. With these new points of view we may get new ideas for applying rocket transportation systems which seem outrageous today.

There is a very recent example of this in the commercial airline traffic over the North Atlantic. The first twenty-five years of commercial transatlantic operations celebrated this year are a classic example of the evolution of a transportation system. From humble beginnings in 1939 with slow flying boats, small payloads, and irregular schedules, the transatlantic air bridge has grown into a giant jet stream of traffic, which will probably carry more than three million passengers between North America and Europe this year.

At any rate, it seems evident that there is a logical basis for saying that rockets do indeed form the basis of a tenable transportation system, and this estimate is reinforced by the historical development of transportation systems on this planet.

However, one note of caution pertaining to this historical precedent: The development of *intra*planetary transportation systems, between points on the surface of earth, has taken place in the presence of the obvious requirement to move things and people from place to place. This has presented a very visible economic forcing function which thus far is lacking in *inter*planetary transportation, where information collection and exploration are the only presently visible rewards.

Indeed, this fundamental difference seems to me to make it even more important that we undertake space research and exploration in a highly organized fashion; and that, for the moment, we do not attempt to look beyond the information phase of research applications of astronautics.

The basic problem, I think, in preparing a long-range plan for exploration of our solar sytem is to make the plan sufficiently broad and imaginative to maintain a continuum of effect, yet at the same time avoid preconception of details in carrying out the plan.

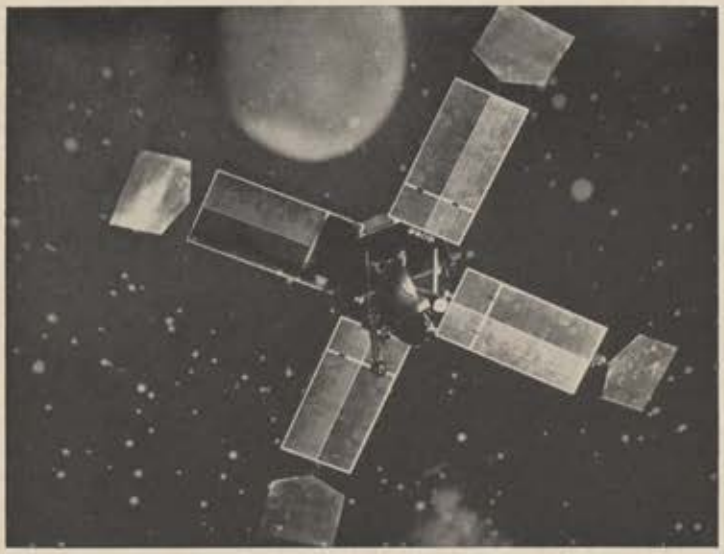
Now that statement may sound like double-talk, but it is not; it simply states the paradoxical nature of the questions we will need to answer as we move forward.

As yardsticks, or templates, for solving this continuing series of dilemmas, I propose the following:

- The three principal constraints on any given exploratory mission are: (1) presence of a satisfactory launch window for departure from earth—either from earth's surface or earth orbit; (2) satisfactory window for return to earth; (3) availability of flight-proven hardware adequate to accomplish the planned mission. No specific mission should be planned in such a way that fulfillment of these three requisites is not possible.
- The modular, or incremental development, principle should apply to launch vehicles and flight vehicles. Basically, this means that a launch vehicle or flight vehicle should be expected to serve as an element of succeeding generations of vehicles, or as a reusable vehicle.

In other words, we should view all these equipments and procedures as meshing elements of a total interplanetary transportation system.

If we can do this, we can avoid some of the mistakes made in earlier development of transportation systems on this planet. One example: rail-



Just the beginning of what is hoped will be an orderly and well-planned exploration of the solar system is the Mariner effort, now under way to Mars, to obtain data on our neighbor planet.

ways of varying track gauge, which impeded the interchangeability of equipment. Another: the national variations between the left-hand and right-hand sides of the road. Here the economic forcing function of international commerce in autos has brought increasing standardization.

The reasons for this are obvious: flexibility in detailed mission scheduling, reliability, and cost. And we should not overlook, in the case of manned vehicles, the advantages of crew familiarity with vehicular controls and environments which change in an incremental manner, as the missions get increasingly complex. In contrast, if each new major mission requires wholly new crew training, greater costs and time will be required.

- Earth orbit can be the "proving grounds" for both vehicles and crews. With proper planning, useful experiments concerning earth and the near-earth environment can be conducted as a "bonus" of these training missions.
- For the examination of other planets, we should have at our disposal a selection of missions (each attainable with "master plan" modular equipment). The selection should range from the relatively simple to the complex:

(1) Instrumented fly-bys.
(2) Unmanned orbital or "capture" missions.
(3) Manned fly-bys.
(4) Manned orbital laboratories.
(5) Instrumented surface probes operated from manned orbital laboratories.
(6) Manned landings.
(7) Manned colonies.

This progression permits collection of an incrementally greater volume of information with each step. The missions may be undertaken in progressive order; steps in the progression can be skipped; or the progression can be terminated at any desired step.

The determinants in making these choices are:

(1) The quantity and quality of the information acquired in each progressive step, which will determine which following step offers the best chance of a desired payoff.

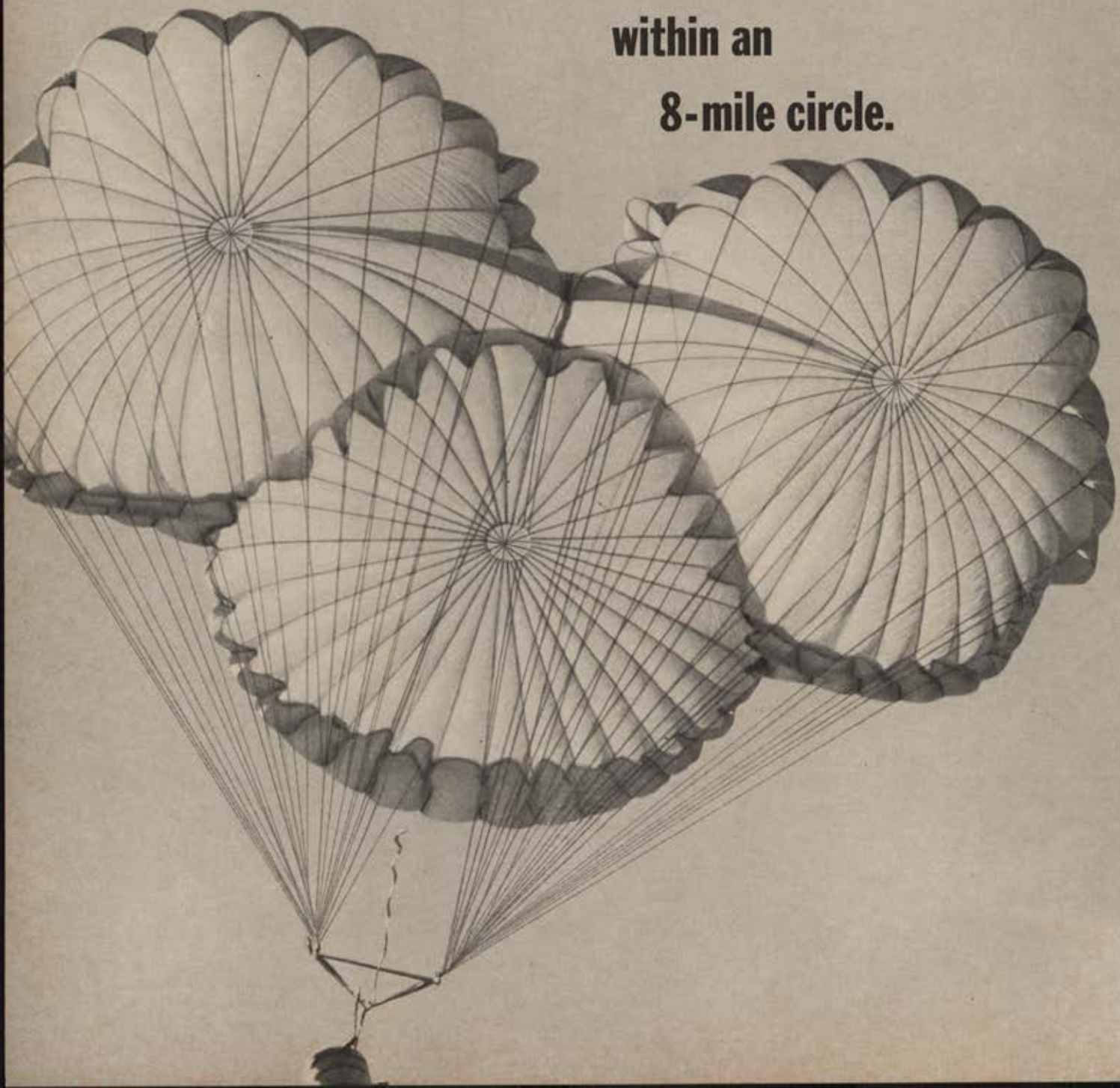
(2) The amount of information already available from previous exploration; *i.e.*, if a preliminary look at a given planet indicates conditions similar to those already discovered elsewhere, further examination of that planet may be deferred.

(3) National goals. For example, if interest at that time is to plant the flag on as many planets as possible, minimal "planet-hopping" missions may be desirable. On the other hand, if establishment of colonies is the goal, the full progression of steps will be more attractive.

Such a program can be, in effect, a sort of Lewis and Clark type of general survey of our solar system—setting out the major baselines for later exploration, meanwhile noting the areas offering greatest opportunity for later, more intensive, exploration and development.—END

J. R. Dempsey is President of the Astronautics Division of the General Dynamics Corp., and a veteran of US military and civil missile and space programs. The above article is condensed from a longer presentation, originally titled "Astronautics, Past and Future," which Mr. Dempsey presented at the University of Michigan's celebration of the golden anniversary of its Department of Aeronautical and Astronautical Engineering, College of Engineering, on October 9, 1964, at Ann Arbor, Mich.

This is a new kind of recovery parachute called the Cloverleaf. From 10,000 feet it can be steered to any landing spot within an 8-mile circle.



The three-canopy Cloverleaf has repeatedly demonstrated that it will glide more than two feet horizontally for each foot of descent. Its variable glide ratio and ease of steering give the controller plenty of time to guide it to a gentle landing on a selected spot.

The Cloverleaf can be controlled from the ground or from an aircraft. It can home in on a beacon.

This new concept in parachute systems gets its high performance from low-porosity canopy material, pointed leading edges, double flaps for glide and turn control, and the high aspect ratio of the three combined canopies.

The Cloverleaf has been developed with support from the U.S. Air Force and the National Aeronautics and Space Administration. It points the way to fully controlled land recovery of large space vehicles and boosters, the pinpoint landing of air-dropped supplies, and the controlled landing of high-altitude instrument systems.

The Cloverleaf concept grew out of the continuing research in paradynamics carried on by Northrop's Ventura Division. Northrop Ventura has developed the parachute landing systems for NASA's Mercury, Gemini and Apollo programs.

NORTHROP

Exploration of the frontiers of space medicine, support of NASA's medical requirements, the training of USAF's flight surgeons, preparation for the Air Force Manned Orbiting Laboratory project, high-quality clinical medicine, analysis of survival requirements in extreme environments. These are just some of the daily jobs of . . .

USAF's Wide-Ranging Aerospace Medical Division

A Space Digest Photo Report

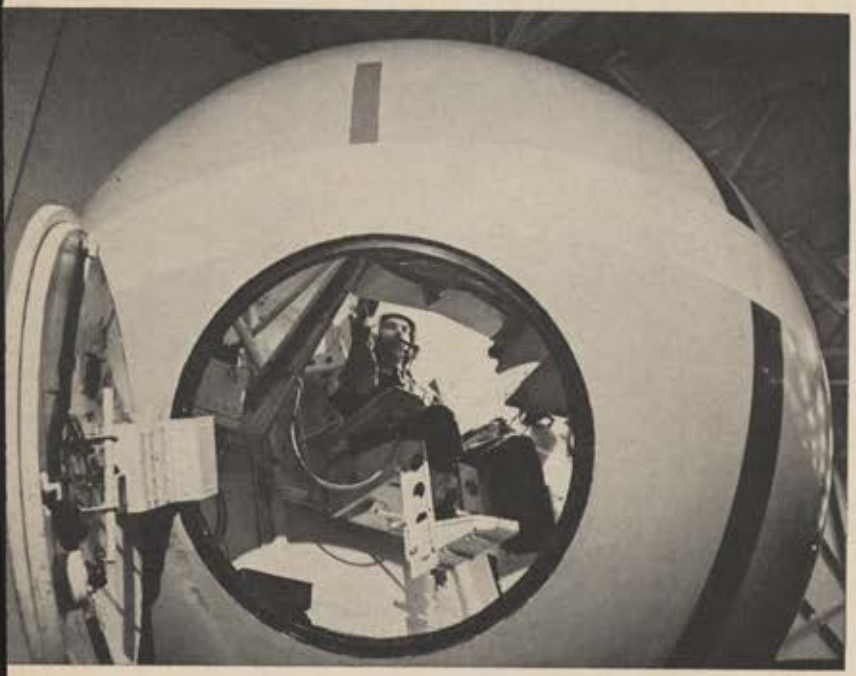
In place at USAF's School of Aerospace Medicine at Brooks AFB, Tex., is the versatile manned space simulator chamber. The simulator provides capability for a wide range of atmospheric mixes within an area comparable to that of the projected Air Force Manned Orbiting Laboratory two-man space capsule.

HOW nutritious is dehydrated toast as a spaceflight diet? Is a liquid diet better than solid food? Can helium be used as a component of space-cabin atmospheres? Can a chimpanzee's in-flight skills be extrapolated to man? How much does a man sweat in subzero temperatures?

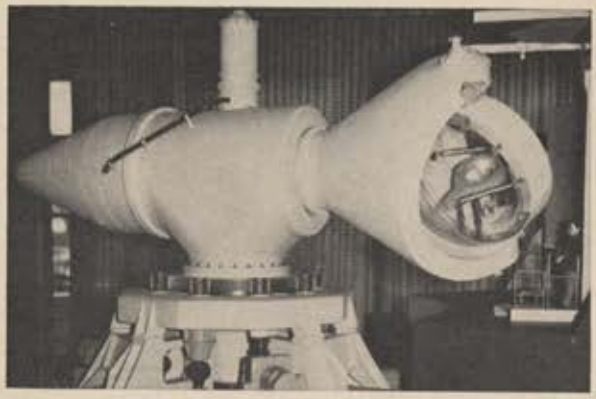
These are just some of the everyday research questions being asked—and answered—at the widespread laboratories and field facilities of the Air Force Systems Command's Aerospace Medical Division, headquartered at Brooks AFB, Tex., and commanded by veteran aero-medical specialist, Maj. Gen. Theodore C. Bedwell, Jr., USAF (MC).

Beyond its mission of aerospace medical research at its labs at Brooks; Wright-Patterson AFB, Ohio; Holloman AFB, N.M.; and in Alaska, where the emphasis is on Arctic survival, AMD also trains USAF's flight surgeons, as well as medical personnel from allied nations. Clinical medicine is AMD's job too, and its hospital at nearby Lackland AFB, Tex., is a major referral center for specialized treatment.

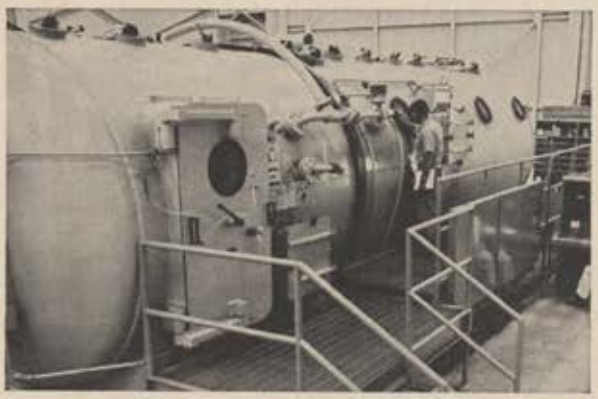
Two of AMD's prime jobs today are research on medical parameters of the Manned Orbiting Laboratory project and support of NASA medical requirements. AMD's long history of space-medical study dates back to 1949, when the world's first space medical research study group was founded at Randolph AFB, Tex.—END



By taking a spin in this new "giant ball" rotational flight simulator at Brooks, astronauts and pilots will attempt to condition themselves to disorienting movements in space. Weighing 6,400 pounds, the new device floats on air in a 360-degree movement, and can be controlled either by subject inside or by a monitor outside the simulator.



Above, a model of the Division's Dynamic Escape Simulator, which replaced older human centrifuge at AMD's Aerospace Medical Research Laboratories facility at Wright-Patterson AFB, Ohio. New tool duplicates acceleration forces in new flight systems.



When USAF's Manned Orbiting Laboratory project was assigned to the Aerospace Medical Division as a research mission in 1963, Division scientists immediately began analyses of identification, control, and adaptive mechanisms of man during expected flights.

Heading the vast complex of the USAF Aerospace Medical Division headquartered at Brooks is Maj. Gen. Theodore C. Bedwell, Jr., USAF (MC), one-time SAC Command Surgeon and veteran aeromedic.

Ancestor of today's manned spaceflight simulator was this much smaller environmental space chamber installed in 1954 at AMD's former site, Randolph AFB, Tex., shown being inspected by Dr. Hans G. Clamann, now Chief, Aerospace Medical Research Division at Brooks.

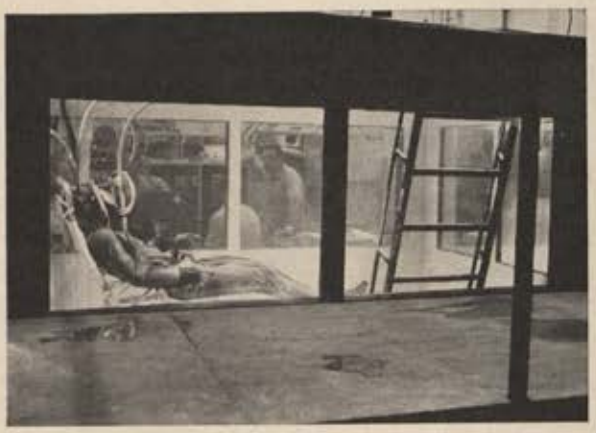
Left, a quartet of college-student volunteers at Wright-Patterson lab dine on special 2,500-calorie diet in six-week nutrition-confinement tests, under way as part of USAF-NASA joint nutrition study using freeze-dried and fresh foodstuffs.

One of most significant research studies under way currently at Brooks is long-term effects of helium as a space-cabin atmospheric component. Above, AF volunteer subjects are greeted as they emerge from 16-day test. Reports indicated no apparent untoward effects.

One question in USAF-NASA nutrition study is comparative effects of diets of freeze-dried and matched fresh foods. The freeze-dried food, such as toast shown here, can be reconstituted by adding room-temperature water, and eaten from pack.

USAF's spaceflight-school for chimpanzees, where Enos, the famed US simian astronaut, got his training, is at Aerospace Medical Division's Holloman AFB, N. M., site. Chimps learn complex tasks, ride centrifuges, and prepare way for humans.

Body-moisture buildup can be a hazard to cold-weather survival. At Division's Protective Equipment Section, Ft. Wainwright, Alaska, a subject does mild walking exercise at 30 degrees below zero to check actual amount of buildup in subzero condition.



Weightlessness studies for manned spaceflight projects are conducted in this 3,000-gallon water tank designed by Aerospace Medical Division specialists at Brooks. The tank was installed in 1964. Immersion tests in tank provide data on subject's response in terms of heart-action, blood pressure, respiration.

General Bedwell, center, receives reports from key personnel: clockwise, Dr. Hubertus Strughold, Chief Scientist; Col. Frank M. Townsend, Vice Commander; Col. John E. Pickering, DCS/Research and Development; and Col. Jack C. Carmichael, Chief of Staff.

At Holloman, research volunteers get a high-G vertical ride upward in this special shock tester to determine their reactions to sharp accelerative impact.

Clinical medicine is important part of AMD's activities, too. Above, at Wilford Hall Hospital, Lackland AFB, Tex., mechanized blood purification is one of two major steps being taken to sustain patient with chronic kidney failure. Actual surgical kidney transplant is undertaken to restore lost kidney function.

AMD's Wilford Hall Hospital is major referral center for specialty treatment, and receives many child patients for surgery such as this open-heart operation. Open-heart surgery on children of Air Force personnel is scheduled, when medical circumstances permit, during summer to avoid long school absences.

Among the numerous Arctic survival efforts under way at the Alaskan laboratories of AMD is cold-weather testing of personnel reactions to exposure, using equipment for measuring body temperatures from remote distances. The snow tractor houses equipment for such studies at the lab at Ft. Wainwright.

Another important continuing study at AMD's Arctic Laboratory in Alaska is on survival shelters. Above, an experimental shelter gets a brutal test on ocean ice near Point Barrow, Alaska. The shelter was set up on top of snow behind a natural windbreak of upheaval sea ice, to afford maximum safety factor.

Tomorrow's colleges won't be merely today's on a larger scale to meet population pressures. The student body will be more heterogeneous and will include older persons updating skills, married women reentering the labor market, and retired people. Colleges and universities will play larger roles in community development too. But they cannot be expected to do the entire job of providing . . .

Higher Education for the Space Age

BY LOGAN WILSON

President, American Council on Education

THERE was some crystal-ball gazing recently on the elementary and secondary educational levels in a booklet published by the New York World's Fair Hall of Education. It summarizes the forward look of a few schoolmen to the year 2000. They see the child of tomorrow as being able to learn at home by secluding himself in an egg-shaped, plastic "study-sphere" equipped with film screen, television, microphones, tape recorders, and a "complete retrieval system for information from any part of the world." For those youngsters whose parents might prefer not to have them underfoot —or under plastic—there would be the option of attending the School of Tomorrow. It is described as a huge, windowless structure covering fifty city blocks, enrolling 60,000, and providing a completely controlled environment.

What a "space-age" college or university campus of tomorrow may be like, I have no idea, and I cannot imagine how the student of the future may "plug in" on higher education. But before we begin to visualize strange, egg-shaped structures in which collegians may painlessly acquire knowledge, we might remind ourselves that a good deal of teaching still goes on in buildings erected before 1894. Moreover, I know professors and their students well enough to doubt that anybody will ever be able to design a "completely controlled environment" for them, much less get them to accept it.

Despite the essential conservatism of academic institutions, however, the winds of social change are already being felt. Still to be seen is whether their force will be used to improve as well as expand our educational system and whether that system will be used to the fullest.

We must look realistically at the social changes affecting higher education and decide what to do about them. In my judgment, the main factors of change which will bring modifications in our educational system are: population growth, technological advance, urbanization, equalitarianism, and internationalism.

Although population growth necessarily must taper off in the future, it looks now as if enrollment in colleges and universities will rise to 11,500,000 by 1984—a figure almost triple the current 4,000,000. The certain prospect of more college-age youth, and more wanting to attend college, implies an institutional expansion far beyond anything we have yet seen. We could effect this expansion by tripling the size of existing institutions or by increasing their number from the present 2,000 to 6,000. My guess is that we shall compromise between these two extreme courses.

As we confront the tremendous task of expanding and improving our whole system of higher education, we ought to be guided wherever possible by what can be learned from research and development focused on education itself. For example, we are relatively uninformed about what makes a good regional balance among junior colleges, four-year colleges, technical institutes, and comprehensive universities. Nobody seems to know very much about such a basic consideration as the optimum size for a particular kind of institution.

Few persons seem to be giving much serious study to the individual and social implications of the great increase recently in student borrowing as a means of financing education. Meanwhile, by our actions we are triggering sequences of events which may reach far into the future, and, whether we plan ahead or improvise, it can be foreseen that our colleges and universities will have to accommodate vastly increased numbers.

It is unlikely that the educational programs of tomorrow will simply be those of today on a larger

scale. Student populations not only will be larger but also more heterogeneous. Older persons needing to update or extend their knowledge and skills, married women wishing to reenter the labor market, retired persons bored with their enforced leisure, and hosts of others will be looking to our colleges and universities. As the pace of change accelerates, the rate of obsolescence in previously learned patterns will also rise, and formal education for some may well become a lifelong process. Urban colleges and universities may be expected to play especially important roles in the fields of adult and continuing education.

I suspect that few of our campuses will survive as neat and tidy little communities apart from the world around them. Already the quiet groves of academe are in many places disappearing as trees and grass give way to high-rise buildings and parking lots. Nearly everywhere there is heavy two-way traffic between the campus and the community.

In terms of the organization of learning, it seems certain that we shall have more evening and part-time programs, fewer lock-step courses and credit requirements, easier student transfer, fewer parochial standards and more national norms of achievement, fewer disciplinary rigidities, and more flexibility.

We shall need to remind ourselves constantly that doing things differently does not necessarily mean doing them better. I doubt that ten-story dormitories are superior to two-story buildings as environments for student living, and quite a few of us are dubious about the magnitude of campus parking areas as a measure of educational progress. Laxity of standards can easily be mistaken for flexibility of standards. Those of us who really care about education must do all we can to see that expansion is not attended by dilution in quality.

Turning from demographic to technological change, one encounters another familiar term, "the explosion of knowledge." Although it never has been necessary for everyone to know everything, our institutions do confront the unavoidable task of having to teach more as knowledge itself multiplies.

We have read and heard much about closed-circuit television, teaching machines, language laboratories, and the various electronic devices expected to revolutionize many kinds of learning. Much less has been said, however, about any drastic efforts to improve the teacher himself. On most campuses he is still left entirely alone in the sanctity of his classroom and laboratory. To be sure, his colleagues criticize and evaluate his research, but few of them pay any attention to his teaching. One of my predictions is that we shall remedy this neglect and thereby greatly improve classroom and laboratory instruction.

The rapid growth of knowledge will also require more general attention to its organization, synthesis, and dissemination. To cope with the continuing expansion of knowledge in virtually all fields and to counter its further fragmentation, we must develop "systems concepts" to educate human beings who can function in a knowledge-oriented society.

In the physical and biological sciences, unifying conceptions are already pulling related disciplines closer together. The practically trained engineering graduate today is the broad generalist rather than the narrow specialist. While it is regarded as heretical in some academic circles to think that the humanities need anything except more financial support, in my opinion they, too, are in need of internal reform.

Another trend affecting all levels of education is urbanization. More than eighty-four percent of the American people now live in 212 metropolitan areas, and these same areas encompass eighty percent of our productive industry. These facts mean that the main burden of the educational job ahead will be upon large urban institutions. Our educational programs, in the main, have to be conducted where the people are, because most students get their advanced training near their homes. About seventy-five percent of all college students attend less than twenty-five percent of the existing colleges and universities, with the majority of them in cities of 100,000 or more.

It is no wonder that every town of any size wants a college, and every large city at least one comprehensive university. Higher education has itself become big business and is now recognized as a growth industry. During the past decade, public expenditures for higher education have gone up from $1 billion to $5 billion, and the next two decades doubtless will witness an even heavier investment.

With a more complex social order accompanying the growth of technology and urbanization, the market for abilities of the uneducated declines as that for the highly educated rises. Trained manpower and science-based industry emerge as determining factors in our economic growth, and become no less important than markets, natural resources, and transportation.

It seems we have moved from a stage in which too little was expected of higher education to one in which we may be expecting too much. None can foresee clearly the implications of new scientific and technological requirements for the labor force, and I think it would be an error to treat education merely as a dependent variable whose direction is determined solely by forecasts of manpower needs. We must remember that education not only responds to but also helps produce technological advance and economic growth. Moreover, the complex interrelations between educational attainments and the labor force, scientific advance, occupational requirements, and educational planning cannot be reduced to simple formulas.

There is a danger that our colleges and universities may lose their integrity by becoming mere educational service stations or supermarkets. The campus must not be isolated from the world around it, to be sure, but it must be insulated against pressures which would in effect displace the freedom of teaching and inquiry with a subservience to utilitarian needs of the moment. I would agree that our institutions should be seedbeds of ideas for social-action programs, but I doubt the wisdom of involving them directly in the operation of such programs. I think we need to guard against overemphasizing the service function at the expense of everything else.

I believe that, in our urban institutions and large universities, special efforts should be made to offset the growing depersonalization of higher education. As the university becomes involved in more outside concerns, it would be unfortunate if the sense of community among teachers and learners were lost. Many of the best values of higher education are bypassed when students are on the campus merely to attend classes, and professors see them only in aggregations. Still another aspect of depersonalization is the tendency to regard the college population as manpower digits and to value the ends of education largely in terms of an increase in the gross national product. I hope that we shall continue to hold to our faith in the improvement of human beings as an end in itself.

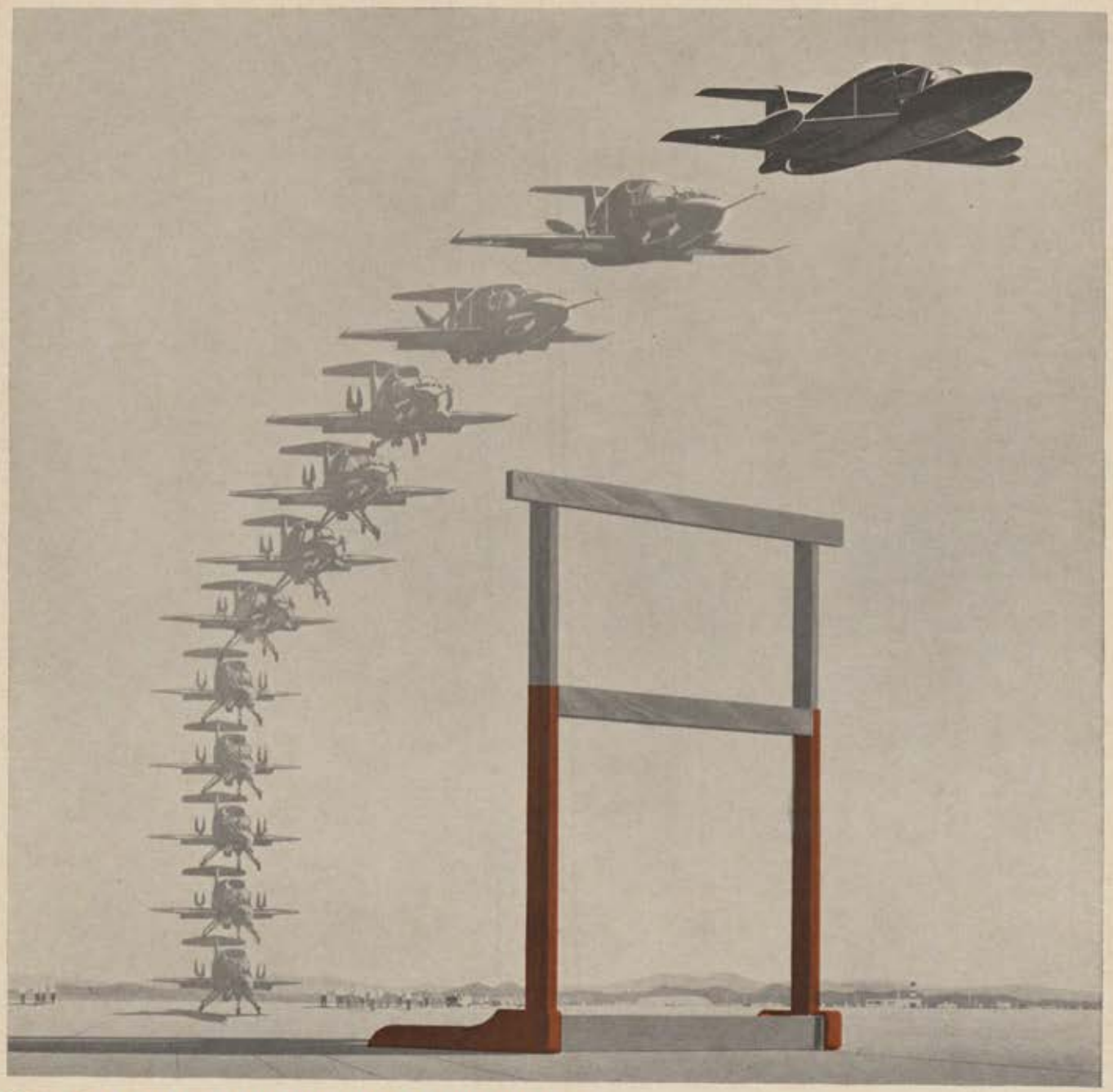
Despite our national accomplishments in mass education, the movement toward more equalitarianism in American society implies new obligations for many of our colleges and universities. We are all aware that the people at large now sense as never before the crucial role played by our educational system as a determiner of individual life chances. This is why our schools and colleges have been objects of litigation and arenas of conflict in recent years in the struggle for equality of opportunity. As I have said elsewhere, the formal or legalistic resolutions of issues should not lull us into the mistaken notion that the struggle is over. The mere removal of procedural obstacles to equality of educational opportunity gives no assurance that it will become a reality. It is beyond the power of the law to grant educated competence to any individual or category of individuals.

In a democratic society not only do we have an obligation to eliminate discriminations against Negroes and other minorities, but also a collective need to do something more positive educationally for all of the culturally deprived. Aside from a moral responsibility, we must make more effective use of education as a means of turning these people into more productive citizens to strengthen our total economy and stabilize our society. We can ill afford to ignore the fact that their needs are indeed our needs.

Although more of our people must be brought to higher educational levels, with opportunities open to all who have the capability and ambition, regardless of their financial means, let us not foster the growing delusion that everybody should go to college or that some kind of academic degree is required as a ticket of entry for every occupation of any respectability. We need to bear in mind also that native differences in ability tend to become more conspicuous with education.

Education alone should not be expected to carry the whole burden of furthering equalitarianism and transforming our society. Other social institutions must share in the responsibility for combating ignorance, incompetence, prejudice, delinquency, disorder, and immorality. The products of higher education have enabled us to transform nature. I hope that during the next twenty years we can learn more about how to transform ourselves.—END

Dr. Wilson, whose article, "Is the Student Becoming the Forgotten Man in Higher Education," appeared in SPACE DIGEST, *December '64, is the President of the American Council on Education. As a sociologist, he has written extensively in the field. Before coming to ACE, he was President and Chancellor, the University of Texas System. The above is condensed from a presentation to a meeting of the Associated Urban Universities at Pittsburgh, Pa., November 2, 1964, and appears here with permission.*



FORGED IN RYAN'S SPECTRUM OF CAPABILITIES

A LEADER in the V/STOL RACE

The fixed wing vertical takeoff and landing (VTOL) aircraft must take off with no ground run, hurdle operational and geographic barriers, transition to high speed flight, carry out an assigned military mission, then land vertically in a battlefield environment.

Ryan-designed XV-5A lift-fan research aircraft have fully demonstrated this basic capability. It is one of the leaders in the V/STOL race because its lift-fan propulsion system successfully triples the force of normal jet thrust when diverted to spin rotor-like fans for vertical takeoff.

Only in the XV-5A does the basic power need for conventional operation match that needed to achieve vertical flight. Thus, a usual penalty for V/STOL has been greatly reduced.

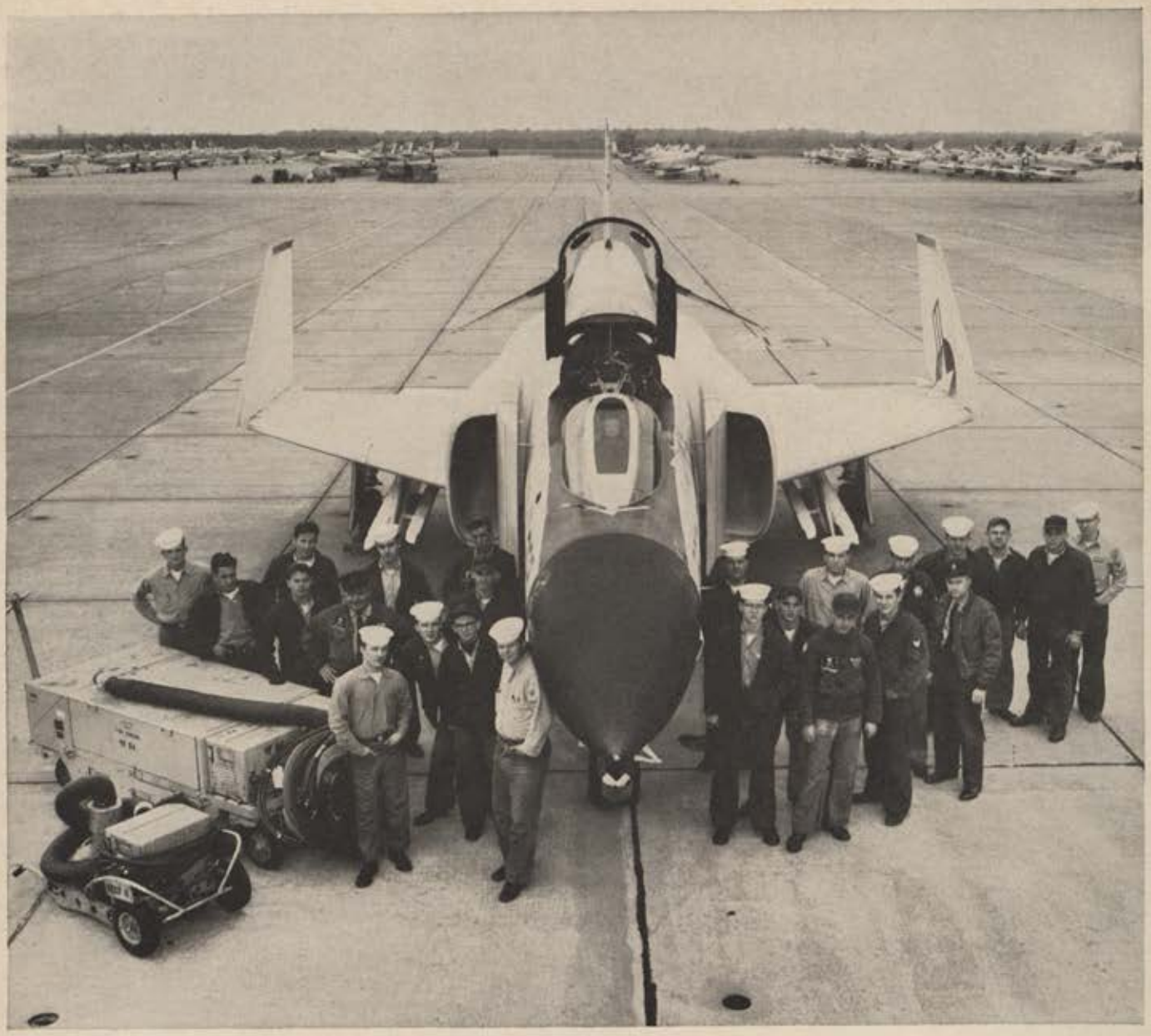
Ryan designed and built the XV-5A under contract to General Electric, developer of the propulsion system for the U. S. Army.

The basic lift-fan concept is potentially adaptable to future use for observation, target acquisition and combat surveillance.

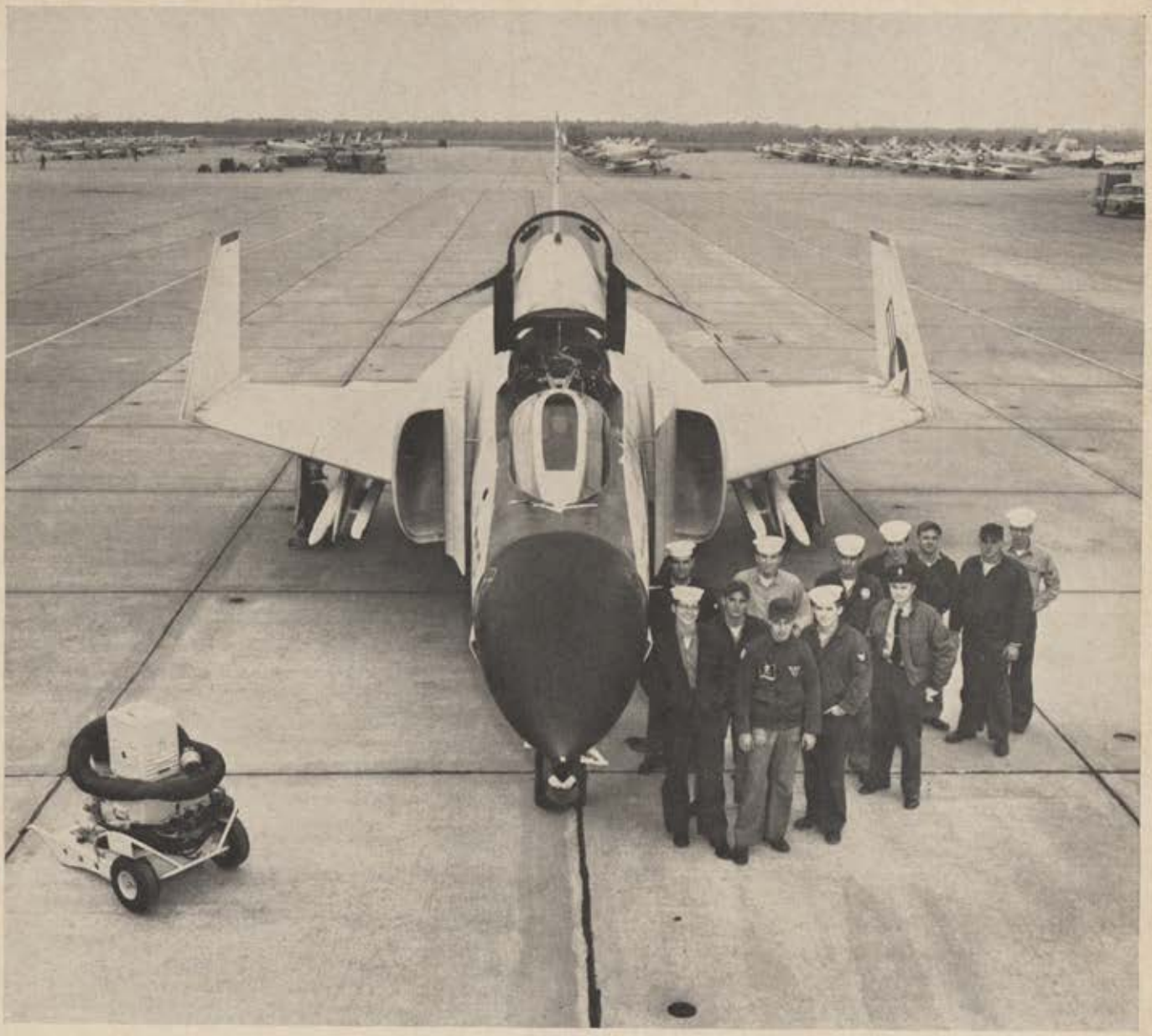
RYAN AERONAUTICAL COMPANY • SAN DIEGO • CALIFORNIA

RYAN

V/STOL AIRCRAFT | TARGET/DRONE SYSTEMS | ELECTRONIC NAVIGATION | FLEX WING VEHICLES | SPACE ELECTRONICS | SPACE STRUCTURES | PRODUCT ENGINEERING



Here's what it takes to service present radars in a typical fighter squadron



but the new Westinghouse AWG-10 radar cuts maintenance costs in half

The remarkable AWG-10 missile control system is a new breed of the famous Westinghouse line of airborne fire control radars. The AWG-10 is being built for the F4. It is a multimission system with true versatility in range and tracking ability, terrain avoidance, follow and mapping. The system performed successfully its initial test flights in late 1964.

The reliability of the AWG-10 is more than twice that of any system now in use. It requires fewer flight line personnel per squadron and far less turn-around time per aircraft. Maintenance costs are reduced by as much as 50 per cent.

Replaceable line units are preset, require no system realignment or tuning. Extensive built-in tests which isolate faults and speed corrective action were pioneered by Westinghouse, the world's most experienced builder of airborne radars. Information is available only on confirmation of your need-to-know through proper security channels. Write to Westinghouse Electric Corporation, Aerospace Division, Box 746, Baltimore 3, Maryland.

J-00376

You can be sure if it's Westinghouse

Speaking of SPACE

BY WILLIAM LEAVITT
Associate Editor, AIR FORCE/SPACE DIGEST

Six Years Later

WASHINGTON, D.C., FEBRUARY 9

The long hiatus in the US manned spaceflight program will end with the first Gemini two-man flight, possibly in April. Again the nation and the world will follow with interest the progress of US astronauts in space as the Gemini two-man team makes its three-orbit flight.

It seems years, and it is, since the Original Seven were unveiled to the world. Six years ago, at National Aeronautics and Space Administration headquarters in Washington, the celebrated Mercury septet, in the glare of television lights, talked to newsmen and the world of how they had come to the first US manned spaceflight program and of the future to which they believed they would be contributing. They seemed, and were billed as, larger-than-life, red-blooded Americans. And, through the power of publicity and a responsive press, they did for a time attain a kind of superhuman quality that went beyond reality.

The glorification of the Seven was not their own doing, of course. Doubtless, beyond the simple vanities to which we are all prey, they must have been annoyed by the constant trumpeting of their every movement.

Now, six years later, their ranks are thinned. Of the original group, John Glenn, the first American to orbit the earth, is completely out of the NASA flight program, although still a consultant. He has retired from the Marines. He carries the unhappy memory of an aborted bid for high political office, ended by injury. Today he is working for a soft-drink company.

His colleague, Alan Shepard, who thrilled the nation with his suborbital flight in 1961, is still working for NASA in Houston, in the astronaut activities office, but is probably permanently out of the flight program in view of his forty-one years and the inner-ear infection that has plagued him for some time now.

Donald Slayton, considered by many the best pilot of the Original Seven, never got the chance to fly in space at all. He was taken out of the flight program after the acknowledgment that a slight heart anomaly presented too much of a risk.

And finally, Malcolm Scott Carpenter, the second US astronaut to orbit the earth, is on loan to his parent service, the Navy, for participation in an upcoming "aquanaut" effort in which a ten-man team will spend a couple of weeks about 250 feet below sea level in the research vessel, *Sealab II*, off the Southern California coast. Carpenter has had his physical troubles too. He broke an arm last summer in a motorbike mishap. It is possible that he, also, has seen the end of his spaceflight days.

Now there are three: Virgil Grissom, who will command the first two-man Gemini flight; Walter Schirra, who will command the backup crew for that first flight; and Gordon Cooper, who will command the third, seven-day, two-man flight late this year or early in 1966. The second, four-day, Gemini flight this year will carry two of the newer

This is the Gemini launch vehicle, shown arriving at NASA's Cape Kennedy, Fla., facility, which will carry Astronauts Virgil Grissom and John Young on a three-orbit mission. The flight will be the first effort since Gordon Cooper's 1963 Mercury flight.

This electrothermal gun device fires synthetic micrometeoroids at speeds up to 12 mps at North American Aviation Lab, Downey, Calif. Lower left, micrometeroid (white sphere) shown on head of penny. At right, a closeup of crater caused by the projectile.

batch of NASA astronauts. All of these flights will contribute to the advancement of spaceflight, despite the acknowledged lag in the Gemini program, but the two-man, week-long Gemini flight Cooper will lead will be especially important. It will supply some answers to the nagging aerospace medical questions centering around the effects of extended human exposure to weightlessness.

It seems incredible that so much time has gone by since the Seven first entered into the whirl of publicity that changed their lives, and even briefly marred the perfection image.

The memories are not all sweet. The Seven were embarrassed by what were interpreted by some as efforts to take commercial advantage of their hallowed national status. There was the high-priced publication in *Life* Magazine of their flight accounts. There was the howl about offers of homes in the Houston area. There were rumblings about motel business activity near Cape Kennedy. There was irritation over apparent direct approaches, over the head of the NASA organization, to the White House.

And now, millions of words and several important achievements later, this fantastic opening chapter in the history of American manned spaceflight has come to a close. The new men, the teams of astronauts recruited by NASA from the military services and from its own supply of test-pilot civilian personnel, will do the next round of space flying. Their names are barely known to the country. Their activities have been reported perfunctorily, and, although they, too, will be properly heralded for their extended flights and for their monumental landing on and return from the moon, it will never be quite the same as it was with the Seven.

All this is not said to further glorify the original team. They did a job they wanted to do, and each member of the seven-man group has been amply rewarded with celebrity, national acclaim, and financial security.

It is more by way of looking backward from a perspective that is available only now that Project Mercury is in the past.

So much has happened and so little. In six years the country has demonstrated its ability to put man into space and keep him alive there. It has demonstrated, too, the remarkable prowess of the industry team which, pressed by time, was able to develop the hardware to do the demonstration job.

Yet at the same time it can also be said that in the six years since Mercury started, and in the nearly eight since Sputnik, too little has happened in the areas of planning and policy.

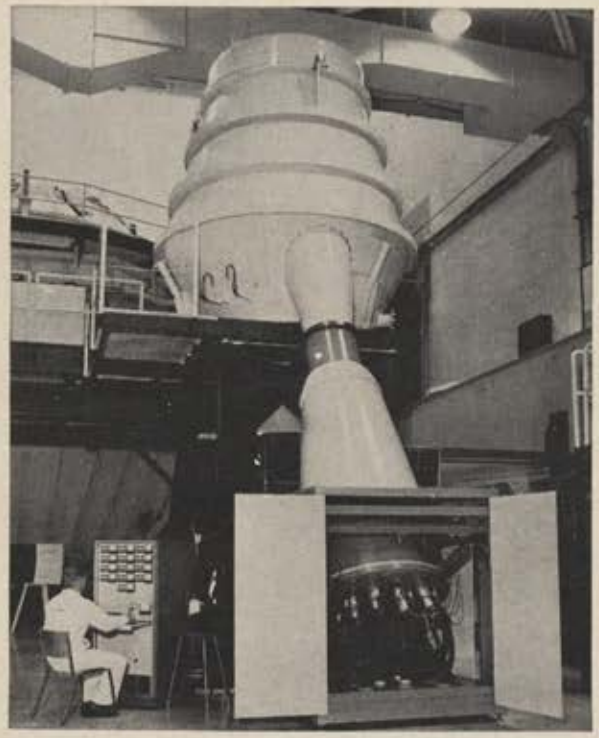
This shortage encompasses politics and technology. In retrospect, it is valid to ask if the giant structure that the National Aeronautics and Space Administration has evolved into from its nucleus, the old National Advisory Committee for Aeronautics, was the best approach to the pressing need for US space operations. Was there too

Boeing space-medicine researchers are studying potential of bed-trampoline device to aid conditioning in zero-gravity. Volunteer lies motionless on sliding bed while being subjected to 1.5 Gs at each bounce. Intermittent G-loads "exercise" the cardiovascular system.

Over and Under... and everywhere in between, the Sperry C-15 Gyrosyn® is the ultimate in compact compass systems. Combining light weight (8 lbs.) with extreme accuracy (±½°), the C-15 is also able to operate under severe environmental extremes (−65°F to +160°F) and at high "G" and vibration levels. For high latitude operation in the free gyro mode, maximum drift is less than 1½° per hour. Four isolated synchro transmitter outputs eliminate the need for a compass repeater amplifier. The DSU-4/A Flux Valve used in conjunction with the C-15 withstands temperatures from −65°F to +392°F and is designed to withstand a 10 "G" vibration environment without shock mounting. Because of these outstanding characteristics, light weight and ease of installation, the C-15 has been selected for the F-111A and B. For further information, write to the **Sperry Phoenix Company, Phoenix, Arizona.**

SPERRY

DIVISION OF
SPERRY RAND
CORPORATION



This solar simulator at Douglas' Space Systems Center, Huntington Beach, Calif., generates a four-foot-wide, 270-watts-per-square-foot intensity, enough to simulate Venus solar environment. Used in vacuum chamber, it will test spacecraft response to sun's heat.

much concern back in 1957 and 1958 that, unless a special operating civilian space agency were formed, the "damned generals would run space" and try to militarize the void?

Today, for example, it is a complex dilemma for a space-minded but also cost-conscious and social-program-oriented Administration to decide between the space-station proposals of NASA and those of the Defense Department. Within NASA itself, there continues a running battle between the Office of Space Science and Applications and the Office of Manned Space Flight over agency priorities and funds. The first office feels cheated by the emphasis on manned spaceflight that has, in its view, taken too much attention and money that should have been devoted to space science research.

The second office takes a dim view of what it considers interagency sniping that hurts the overall image of NASA and endangers the advance of manned flight. At the same time, the scientific community is developing a kind of guilt feeling over its involvement with and heavy dependence on government research-and-development funding and is worrying publicly and loudly about what it scornfully calls "big science." Elements of the scientific community are openly suggesting that the very integrity of science is being put to the test by the space program. The list of policy confusions and the battle over priorities is endless.

A good deal of the confusion is traceable to the overexcitement and underplanning which featured our early space program formulation. The errors that have led to the current dilemmas cannot be erased, of course. But they should suggest new and more sensible policies for the future, policies that would enable the development of national space capabilities summed up in the article, "Criteria for a Rational Space Program," by J. R. Dempsey of General Dynamics/Astronautics, which appears on page 43 of this issue.

A Case in Point

Last month NASA outlined details of its biosatellite program, which will involve the launch and recovery of six satellite capsules containing flora and fauna ranging from wheat shoots to simians, to be orbited for periods ranging from three to thirty days. The purpose of the program is to ascertain the long-term effects of weightlessness in combination with the effects of ambient radiation. The program will start in 1966.

It appears to be a reasonably thought-out program, designed to get some important answers to some vital questions having to do with manned spaceflight. Its experiments are being selected from a long list proposed by members of the scientific community. The program is described as responsive to the suggestions, dating back to 1962, of the Space Science Board of the National Academy of Sciences.

There are only two things intrinsically wrong with the program. It is too little and too late. In view of the unknowns associated still with long-term weightlessness, isolation, radiation, and other spaceflight conditions, it is hard to understand why this basic-research effort is just getting under way, long after the end of the Mercury program, in the expected middle of the Gemini program, and, for that matter, not very long before the earth-orbital flights of the Apollo moon-landing program.

This correspondent recalls talking with one of the country's leading aerospace industry planners several years ago and asking what in his opinion was *the* most important developmental requirement of the national space effort.

He answered that, from every possible point of view, the need was for an orbiting laboratory

capable of extended flight for the study of physiological response to space conditions and for the testing of materials and components in space. He said that, in the final analysis, this was the only way we could get any real idea of what we could do in space, how safe it was for man, how machinery and instruments would work—in a sense, what space was worth to us.

Yet this eminently reasonable and obviously necessary tool for space research still remains unachieved. The closest we can get is a series of biosatellites that should have been launched and recovered long ago. At the same time, lacking much of the data we should have on physiological response, we are pressing ahead with major manned spaceflight operations, culminating with a landing on the moon.

There is no doubt that our manned projects are daring. But policies which have resulted in such a reversal of the natural sequence of research and development are open to question.

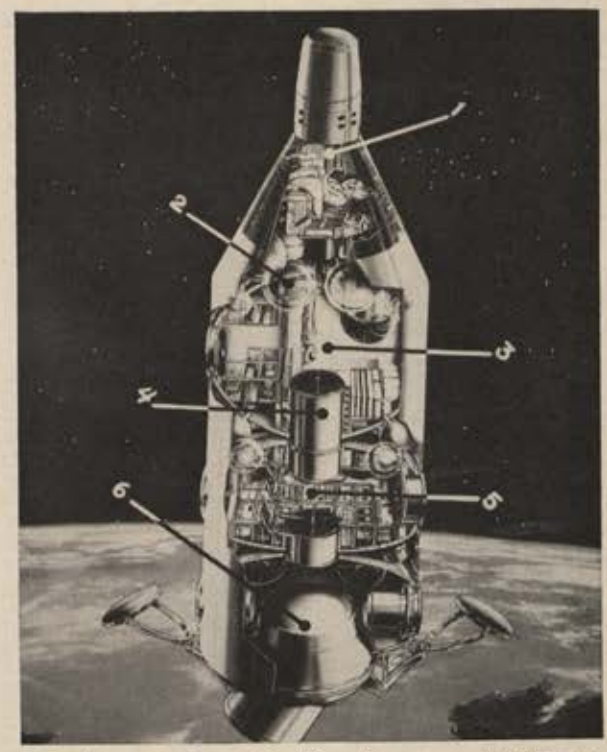
It must be acknowledged that the pressure was on back in the late 1950s and early 1960s to match the Russian achievements, and that no amount of Monday-morning quarterbacking can change history.

But, at the same time, it should be pointed out that now with budgets tighter, and with the relative relaxation of the competition of US and Soviet space efforts, a greater orderliness ought to feature future planning.

For one thing, it seems vital that such efforts as the biosatellite program be upgraded significantly. Public-relations releases describing the in-flight exhilaration of astronauts do not answer the scientific questions of long-term exposure to space conditions that must be answered in great detail if man is to operate in the void.

Secondly, the research, development, and deployment of a Manned Orbiting Laboratory must proceed as a high-priority project as soon as possible. The current spectacle of Defense Department-NASA in fighting over the proposed Air Force Manned Orbiting Laboratory project vs. the NASA-proposed Apollo-X space station development is reaching the inexcusable stage. The MOL has been studied to death, now is apparently being revivified and possibly even enlarged by Defense in a political effort to beat back NASA's ambitions. At the same time NASA, which is caught in budget difficulties that have already delayed its manned spaceflight projects, reduced its space science effort, canceled a couple of major propulsion projects, and held back its aeronautical research, still seems to be demanding control of space-station development or at least a veto power. More attention seems to have been devoted to the formulation of treaties between the National Aeronautics and Space Administration and the Department of Defense than to getting the right projects going at the right time and in the correct sequence.

All of which scarcely contributes to the orderliness which, six years after the announcement of Project Mercury and the introduction of the celebrated Seven Astronauts, ought to be the prime feature of a space-age space program.—END



Artist's conception of Lockheed's proposed MOL configuration. Features include (1) Gemini capsule for astronaut transit, (2) spheres for fuel and equipment storage, (3) living compartment, (4) air lock between compartments, (5) lab compartment, and (6) camera.

"You're a scientist—desalt some water!"

INTEGRATED CIRCUITS
+ MODULARITY
= NEW BURROUGHS D 84 COMPUTER

Basic D 84 occupies less than 1½ cubic feet, weighs only 100 pounds, requires only 110 watts.

Meet a truly unique general purpose military computer, the Burroughs D 84.

Monolithic integrated circuits make it small, light, reliable and fit for the roughest ground, naval or airborne military environment.

Modular design allows it to exactly fit your application--and to expand as your requirements grow--without reprogramming.

Get the new D 84 technical brochure. Write or call Burroughs Corporation, Defense & Space Group, Paoli, Pa. Phone 215 NI 4-4700, Ext. 237.

Burroughs—T.M.

Burroughs Corporation

General Power, author of the new book *Design for Survival* from which this article is taken, commanded SAC from July 1957 until his retirement last November. He entered flying school in 1928 and rose to brigadier general during World War II, serving in North Africa and Europe and later heading the first large-scale B-29 fire-bomb raid on Tokyo, in March 1945. In 1948 he became SAC's Vice Commander and six years later took command of ARDC (now Systems Command), overseeing development of the ballistic missiles he would later command as operational weapon systems. He succeeded General LeMay as SAC Commander in Chief, and under his leadership SAC became first an all-jet bomber force and then a mixed force, as ICBMs entered inventory.

The "Deterrent System" today includes not only the actual weapons but all the complex organization that makes up our strategic defense establishment. Critics call for drastic alterations in this system. But, feeling that it is basically sound, General Power—recently retired Commander in Chief of the Strategic Air Command—in an important excerpt from his new book, tells why we should be cautious about changing . . .

THE NATURE OF

By Gen. Thomas S. Power, USAF (Ret.)

IN military terminology a "weapon system" is defined as a major weapon, such as a bomber or missile, *plus* all the specialized support facilities, equipment, and devices required to operate and maintain that weapon. In the broader sense, a complete weapon system also includes all necessary personnel as well as the facilities to support and train them. The difference between these two terms lies in the fact that a weapon by itself has no military value; only the complete "weapon system" is capable of accomplishing the mission for which the weapon is intended.

By the same token, the tools of deterrence cannot deter by themselves, no matter how sophisticated and self-sufficient they may be. They must be part of what I call a "Deterrent System" in which each component, in cooperation with all others, contributes to an over-all objective. This objective is not merely deterrence of nuclear war, although this is the most urgent mission, but deterrence of any kind of aggression, whether military or nonmilitary. And just as deterrence of military aggression requires a credible war-winning capability, we can meet any other type of aggression only through a similarly convincing capability of the Deterrent System to win any phase of the cold war.

For deterrence is not a goal in itself; it can contain Communist aggression but it cannot defeat the Communist ideology which must be our ultimate goal if we are to survive as a sovereign nation. To achieve this goal requires offensive action—and I do not mean military action—while deterrence is essentially defensive. However, deterrence if successful will keep the playing field open so that men of good will everywhere have the time and freedom of action to work for what the late President Kennedy envisioned as "a peaceful world community of free and independent nations—free to choose their own future and their own system, so long as it does not threaten the freedom of others."

It is evident, therefore, that the Deterrent System goes far beyond the preservation of the "deterrent margin" which is merely a measure of *military* superiority. The Deterrent System encompasses many other factors, both tangible and intangible, which either support the military component of over-all deterrence or serve the exigencies of the cold war. Nor is the Deterrent System limited to national aspects. In a world divided into two camps, with many nations straddling the fence, the contributions of our allies represent an important factor in our common struggle against Communist aggression and expansionism.

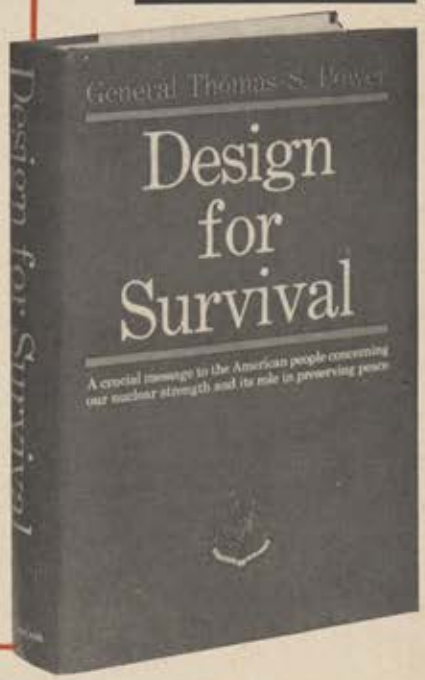
I have the impression that the interrelationship and interdependence of all these factors are not always well understood by our citizens and have not been given sufficient attention in our design for survival. For this reason, I want to discuss some of the principal aspects of our Deterrent System, pointing out the strengths which I feel we should preserve as well as the weaknesses which should be corrected.

Turning first to the military aspects of the Deterrent System and, specifically, the deterrent of general nuclear

On November 30, 1964, Gen. Thomas S. Power, USAF, completed his active-duty service with the US Air Force after a distinguished career of nearly thirty-seven years that began in the days of wire and wood and stretched to the thermonuclear space age. From 1957 until the day in November when he took his last commander's salute, General Power was Commander in Chief of the Strategic Air Command and, as such, the military custodian of the greatest array of military power ever assembled. The primary mission of SAC has, from the start, been the deterrence of general war through the existence of a mix of overwhelmingly powerful air and missile-borne nuclear capability that could destroy any aggressor with crushing finality. SAC's value has been demonstrated through the years but perhaps never more dramatically than in October 1962, when the command's deterrent force provided the retaliatory threat that, in concert with lower-level conventional power, persuaded the Soviet Union to step back from the brink of destruction to which it had dragged the world by its provocative adventure in Castro's Cuba.

On March 22, 1965, General Power's views on subjects ranging from deterrence to the military implications of space will be published in his new book, *Design for Survival* (Coward-McCann, New York, 255 pp., $5). The following article, an excerpt from Chapter 9 of that book, is General Power's discussion of the deterrent system. The material appears here by special arrangement. It is an important excerpt from an important work.

—The Editors



THE DETERRENT SYSTEM

war, a major problem, which was created by our expanding nuclear capability, is the relationship of the diverse "nuclear-capable" strike forces which came into being as a result of the production of nuclear weapons in larger quantities and smaller sizes. However desirable the growth and diversification of our nuclear capability were, they did not proportionally increase the nation's over-all nuclear strike potential because they led to some unavoidable duplication of functions and conflicts regarding areas of responsibility.

The ensuing problems were so far-reaching from the standpoint of national security and their solution so significant that I considered it important to bring this matter to the public's attention and, therefore, discussed it extensively in both official and informal talks. Nevertheless, I feel that the complex problems involved in nuclear teamwork still are not sufficiently understood.

To begin with, the overlapping military capabilities brought about by advancing technology are not, of necessity, undesirable. They are certainly preferable to gaps, especially where such overlaps add to our total fighting strength. On the other hand, overlapping functions can prove wasteful and indeed harmful unless strict control can be exercised in the assignment of distinct areas of responsibility. This applies, in particular, to the increased nuclear capabilities throughout our military establishment.

As long as this entire capability was within one command, namely the Strategic Air Command, coordination of all planning and operations pertaining to the employment of nuclear weapons presented no problems whatever. SAC Headquarters had the sole responsibility for every phase of targeting and mission assignment which not only assured optimum utilization of our then relatively limited nuclear resources but also precluded any duplication and conflicts in strategic air operations.

This was no longer possible when military units outside of the Strategic Air Command attained nuclear strike capability. These units are assigned to the various "unified commands" which are charged with combat operations in a specific geographic area, such as the Atlantic, Pacific, and Europe. The unified commands are composed of elements from all services, as required for operations in their particular area. In contrast, the Strategic Air Command is global in nature and composed of Air Force personnel only. SAC, which is called a "specified command," and the unified commands are under the operational control of the Secretary of Defense through the Joint Chiefs of Staff.

It is important to understand these lines of authority because the commanders in chief of the unified commands prepare individual war plans for their organizations, in accordance with over-all policy provided by the Secretary of Defense and the guidance of the Joint Chiefs of Staff. As the war plan of each unified command is concerned strictly with operations in its assigned geographical area, there is little likelihood of conflicts with the operations of other unified commands. However, since SAC's opera-

(Continued on following page)

tions are global, conflicts did arise with SAC's war plan once the various geographic commands achieved a measure of strategic nuclear capability.

These conflicts were not merely a matter of overlapping missions. As the unified commands engage in a variety of land, sea, and air operations in their specific areas, their newly acquired strategic task became only one of many and, therefore, served primarily in support of the geographic mission rather than the nation's over-all strategic mission. As a consequence, the strategic operations provided for in the war plans of the unified commands not only entailed frequent duplication and even triplication of SAC operations but actually tended to impair the accomplishment of SAC's mission.

The routing and timing of SAC's bomber sorties are so intricate and complex that electronic computers must be employed to calculate such factors as precise time over target and proper spacing between bombers to ensure maximum mutual support with minimum interference. As increasing numbers of missiles were added to SAC's operational inventory and were assigned targets in SAC's war plan, their timing had to be carefully scheduled also. No such detailed schedules were possible for the new strategic support operations of the unified commands in the various geographic areas. The ensuing problem facing SAC was similar to that of a railroad which runs carefully scheduled trains over its lines and, all at once, finds other trains using its trackage without any schedule.

Apart from the wastefulness of unnecessary mission duplication, there was now the danger that one American airplane or missile might blow another out of the sky over enemy territory. Once these problems were recognized, steps were taken to alleviate them. A system was established by which the commands concerned would hold so-called "worldwide coordinating conferences," designed to coordinate their war plans so as to eliminate duplication and interference in strategic air operations. However, these conferences failed to achieve their purpose, primarily because it proved difficult if not impossible to resolve, through committee action, the many basic differences that developed. Still more difficult to cope with was the factor of time.

Preparation of a detailed war plan is a long and involved task that takes many months to accomplish. Once that plan has been completed, it must be submitted to and approved by the Joint Chiefs of Staff, which takes additional time. Thus, by the time the approved war plans of the individual commands could be submitted to the coordinating conferences and attempts had been made to resolve existing differences, as had to be done in the past, these plans were no longer current. War plans require regular updating because of revised requirements, changes in materiel or deployment, new intelligence, and related factors.

Several approaches were suggested to improve on the inadequate system of worldwide coordinating conferences. Suggestions ranged from proposals for revising existing coordinating procedures to establishment of a "United States Strategic Command." This Command was to incorporate all forces possessing a nuclear strategic capability, including SAC, and was expected to provide, on an all-inclusive scale, the same centralized control of nuclear planning and operations as was exercised by SAC when it was the only nuclear force.

The then-Secretary of Defense Thomas S. Gates realized that the mounting coordinating problem called for bold and urgent action, and he therefore decided to effect a compromise between the widely differing solutions advocated by the three military services. This compromise entailed the organization of a "Joint Strategic Target Planning Staff" under the Joint Chiefs of Staff, which Mr. Gates called "the most important decision I have participated in since I have been in the Pentagon." The new agency was formally established in August 1960 and was given a twofold task, namely, the preparation of both a "National Strategic Target List" and a "Single Integrated Operational Plan" for all our strategic strike forces.

The Secretary of Defense further directed that the Joint Strategic Target Planning Staff, which came to be known by its initials "JSTPS," be located at the headquarters of the Strategic Air Command, at Offutt Air Force Base, Neb., and he appointed me, in my capacity as the head of SAC at that time, as its director. The reasons for this action are obvious. SAC was, as it still is today, by far the largest nuclear force in the free world and, moreover, maintained at its headquarters the most extensive targeting and intelligence facilities for strategic operations in existence.

Because of the unified nature of this nuclear team, the Secretary of Defense provided that the deputy director of the JSTPS be a general or flag officer from another service. Up to my retirement, three Navy vice admirals served successively in this position. The working staff is composed of a relatively small number of carefully selected officers from the Army, Navy, Marine Corps, and Air Force who are experts in the various weapon systems and operations covered by the JSTPS. They develop the nuclear operational plan in conjunction with representatives of all participating unified commands and are supported by SAC's own Intelligence and Operations personnel.

One innovation of the greatest significance to the Deterrent System of the free world was the addition, in 1964, of NATO officers from West Germany, Italy, the United Kingdom, and France as representatives of the Supreme Allied Commander in Europe. While the JSTPS is concerned directly only with the general war plans of the United States nuclear strike forces, the NATO representatives are kept current of our planning as it affects their own operations and thus can assist, on a day-to-day basis, in coordinating NATO's war plans with ours.

The working staff of the JSTPS is divided into two groups. The first group is charged with the preparation of the National Strategic Target List which, in essence, defines the job to be done. This task involves the development of target systems for any number of contingencies and for any combination of potential aggressors within the entire Communist bloc. Thereby, it provides the basis for the work of the second JSTPS group.

That group has the task to work out the Single Integrated Operational Plan for the effective employment of all available strategic forces against the various target systems and under a variety of conditions. This is accomplished in accordance with the "National Strategic Targeting and Attack Policy," which is established by the highest authorities in Washington and spells out our national military objectives in general war. (It is noteworthy that, at the time of my retirement, this Policy still entailed the preservation of strategic superiority and war-winning capability although not enough was being done to ensure the achievement of the Policy's objectives in the future.)

The effective and timely accomplishment of the two JSTPS tasks required one more provision—the director was given the authority to resolve any disagreements that might arise within the staff. Therein lies the fundamental difference between this organization and the worldwide coordinating conferences, for the work of the JSTPS staff

is never hampered or delayed by unresolved disagreements. But the authority which the director was given is not absolute because he must bring any major areas of disagreement to the attention of the Joint Chiefs of Staff who have the right to overrule him. From my own experience as director I can state that this provision acts as quite a "restraint" as proven by the fact that, during my entire tenure, there was not a single case in which the Joint Chiefs of Staff had to overrule my decision.

It is natural that disagreements should arise because each branch of the service, each arm, and each major command has its own requirements and has evolved its own modes of operation to meet these requirements. To integrate their plans and operations into one common mission frequently meant concessions on their part which seemingly were disadvantageous to their own missions. I am happy to say that, in my over four years as director, the members of the JSTPS staff have always subordinated service loyalties and personal preferences to the demands of the national nuclear team. Their extraordinary efforts represent real unification in action.

The importance of these efforts can best be gauged by a brief summary of what has been accomplished. The first National Strategic Target List and Single Integrated Operational Plan were completed and approved by the Secretary of Defense in December 1960—less than four months after JSTPS was established. They were implemented in the spring of 1961 and now are being revised on a regular basis so as to keep our strategic strike forces provided with up-to-date operational plans which reflect the latest targeting information and force structures.

It is difficult to convey a picture of the complexity and scope of these plans whose paperwork alone weighs some nine tons. They not only involve innumerable details, but all these details must be fitted together with painstaking accuracy, tying the operations of thousands of globally deployed elements into one vast integrated and mutually supporting team action. All this complexity, however, is in one place only, namely within the JSTPS at SAC Headquarters. There is little complexity about the end products that are forwarded to the Joint Chiefs of Staff and Secretary of Defense, and to the forces in the field.

The JSTPS provides, in effect, "packaged plans" which give the President of the United States a wide choice of options to meet any contingency and affords him complete flexibility regarding any action he may decide to take for the employment of the nation's nuclear strike force in response to aggression. Once he has made his decision, he merely transmits the appropriate code to the field, and the particular war plan he has chosen will be put into effect immediately. Not a minute will be lost in getting off that vital first counterstrike, to whatever extent and in whatever area or areas the President has selected, because all these contingencies have been taken into account in the various options at his disposal.

Nor does the JSTPS entail any complexity for the forces in the field. It furnishes detailed mission instructions to all operating elements included in the common plan—the Polaris submarines on station, the SAC bombers and missiles on alert, the fighter-bombers overseas, the carriers at sea. Once the President has given the order and designated the option he has selected, all combat crews will know exactly when and where to go and what to do.

It should be emphasized that all this applies only to the initial counterstrike in a general nuclear war because no one can predict the situation after the initial exchange accurately enough to permit the preparation of one common over-all war plan for subsequent operations. Moreover, as a planning staff, the JSTPS has no operational control over the forces represented in it, and its Single Integrated Operational Plan in no way affects the other operations of the unified command. Therefore, they are in the position to pursue freely their assigned geographic mission both during and after a nuclear exchange as well as in any local crises and conflicts in their respective areas.

The only weapon systems under the operational control of unified commands which have strictly a nuclear strategic mission are the Polaris submarines. For this reason, the Single Integrated Operational Plan is written primarily around SAC and Polaris, with all other nuclear-capable strike forces under the unified commands assigned supporting strategic missions contingent on their availability for such missions.

There can be no doubt that the very existence of an integrated nuclear team has lent added weight and credibility to our strategic deterrent. It is particularly gratifying that the invaluable benefits derived from the JSTPS in that respect entailed no added cost to the taxpayers and that, virtually with the stroke of a pen, the nation's nuclear striking power has been strengthened immeasurably. For the first time, this country has a common plan for general war, with a common strategy and common timing, and well-functioning machinery is now in existence to keep this plan absolutely current at all times.

I have dwelled on the Joint Strategic Target Planning Staff at some length because it is a striking example of how our Deterrent System can be enhanced merely through improvements in the management and relationship of its components. Conversely, the Deterrent System can be weakened greatly if unwarranted organizational changes should impair the future utility of the JSTPS. This explanation of its operations and mission applied at the time these lines were written. There is no assurance, however, that this will continue to apply if current trends toward a purely defensive nuclear deterrent should bring about major changes in military force structure.

But even if we should retain our present concept of deterrence through superior and war-winning strategic power, there will be continued need for modifications and improvements in the implementation of this concept which may also affect the JSTPS. While its creation represented a tremendous step forward at the time, only future developments can show whether it went far enough and whether still greater centralization in the management of our strategic forces will become necessary in the years ahead.

As military technology advances at an ever-increasing pace, new weapons and methods of warfare may be developed that may revolutionize military strategy and tactics to an even greater degree than resulted from nuclear weapons and missiles. Current concepts of land, sea, and air warfare may well become obsolete, profoundly affecting the traditional missions and roles of the military services. No one can predict what dramatic changes in military organization this will entail, but regardless of service tradition and sentiments we must always be ready and willing to make whatever changes may be required to improve the effectiveness of the Deterrent System.

The question has been raised whether the nuclear component of our Deterrent System, that is, the strike forces represented on the Joint Strategic Target Planning Staff, does not afford far more nuclear firepower than we will ever need. The Strategic Air Command in par-

(Continued on following page)

ticular has been accused of planning to "overkill" its targets, allegedly to justify its requests for more bombers and missiles. It may be appropriate at this point to try to put the myth of the overkill to rest, once and for all.

The overkill argument has its roots in statements in the literature and press by various "experts" to the effect that our strategic strike forces, of which SAC is the major component and "culprit," program more weapons against their assigned targets than are needed to destroy them. The point is made that one single nuclear bomb or missile warhead suffices to obliterate any target and that sending more than one nuclear weapon against a target constitutes wasteful "overkill," that is, planning destruction where there is nothing left to destroy.

Using the same logic, one might say that it is wasteful to put more than one pellet in a shotgun shell because, after all, one pellet in the heart of a duck or pheasant is enough to kill it, and there is no sense in trying to kill it more than once. Of course, the sole reason why there are several dozen pellets in a shell is to increase the probability that at least one of them will find its mark. If the hunter could predict with absolute assurance which of the many pellets would be the fatal one, he could leave all the others out of the shell and save himself some money. But he does not know; all he knows is that the multitude of pellets in his shell improves his chances of success. While it is still possible that none of these pellets will hit his prey, it is normally more likely that more than one will hit it.

This is essentially the principle that governs the targeting of our nuclear weapons, although the numbers involved are far smaller. In trying to determine the type and number of weapons to be programmed against any particular target system, the JSTPS planners cannot be guided by hopes and assumptions; they must make as certain as possible that these weapons will destroy "the aggressor's capacity and will to wage war" and convince him that this is precisely what would happen should he force war upon us.

This means that the officers who prepare the Single Integrated Operational Plan of the JSTPS must always ask themselves two questions: What probability of destruction is required for any particular target, and how can this probability be achieved? Without going into details, it should be explained that the various targets that would have to be attacked under specific conditions are arranged in order of priority, with the highest priorities assigned to those targets which pose the greatest threat to American lives and property, and to our allies. It stands to reason that, the higher the priority of a target, the greater must be our confidence that we can destroy it if we must. In other words, the desired "kill probability" for any target is established on the basis of its priority rating.

Once the planners have ascertained what degree of assurance is required for the destruction of a target, they must determine the type and number of weapons to be programmed against it. Toward this end they "wargame" each weapon system that is being considered for this mission, all the way from prelaunch to detonation of the warhead. They take into account the possibility that this weapon system may be destroyed before it can be launched, its chances of abort, unfavorable weather conditions, enemy action, duds, misses, and any other factors that may cause the mission to fail. In this manner, the planners arrive at the probability, expressed in terms of a percentage, for a particular weapon system to destroy a particular target to the degree desired.

Let us assume that, in a specific case, the kill probability of a missile has been calculated to be fifty percent, which means that chances for success and failure are exactly even. If the target does not warrant a higher kill probability, only that one missile will be programmed against it. But if the target demands a higher kill probability, at least one more weapon must be programmed. Assuming again—strictly for the sake of simplicity— that each of the two weapons has a kill probability of fifty percent, mathematics show that their combined kill probability is not 100 percent but seventy-five percent. If a still higher assurance of success is required, it is necessary to program additional weapons. (I should mention that this entails the use of different weapon systems and tactics which have different kill probabilities. Because of their variety, they seriously compound an enemy's defense problem in addition to improving over-all chances of mission success.)

It is true that, if it takes several weapons to achieve a kill probability of, say, ninety percent, it is conceivable —although highly improbable—that all would hit the target and "overkill" it. But there also remains a ten percent probability that none of them will hit, leaving a potentially very dangerous target intact. Hence the expressed concern about "overkill" and "needless waste" is utterly unfounded and based on a lack of understanding of the vital difference between a *programmed* weapon and a *delivered* weapon.

It is this difference which explains why any realistic war plan requires more weapons than would be needed if there were assurance that each and every one would destroy its assigned target. This is not a matter of waste and "overkill" but of giving substance to our deterrent and, if deterrence should fail, of minimizing our losses and the danger of defeat.

We are playing for the highest stakes there are, the survival of our nation, and we cannot afford to leave the success of the most important military factor in our Deterrent System to chance and wishful thinking.

In addition to the nuclear strategic forces, the military component of the Deterrent System comprises all of the other forces in the Army, Navy, Marine Corps, and Air Force. This includes also the trained men in the Reserves and National Guard. The Deterrent System, as previously defined, goes beyond the deterrence of general nuclear war, which is primarily the task of the nuclear strategic forces, and hence demands superior military strength in every aspect of modern warfare.

This is the more important as we are in a retaliatory role which means that the initiative lies with the Communists, and that they are normally the ones who choose the locale and timing as well as the type and scope of military action in which we may have to engage. As a result we never know when, where, and how they may plan to strike, and we can hope to deter them from doing so only as long as we manage to convince them that we are prepared *and* determined to meet and defeat them anywhere and any time, and in any kind of conflict. That is the reason why we need credible superiority across the *entire* spectrum of warfare on land, at sea, and in the air.

Of equal importance to our Deterrent System is superiority in defense, especially defense against a missile attack. As I pointed out earlier, the Soviets are not likely to risk a deliberate missile attack against this country unless two conditions are met: One, they must be convinced that they can keep the damage to be expected from our retaliatory attack within acceptable limits and, two, they must be confident that their attack will achieve

the desired result, that is, inflict such decisive losses on us as to force our surrender.

To meet the first condition, the Soviets must either neutralize most or all our retaliatory forces, which is virtually impossible with our present mixed force, or perfect reliable defenses against our strategic bombers, ICBMs, and Polaris submarines. And to be confident that they can meet the second condition, the Soviets must be certain that *we* have no effective defenses against their land-based and submarine-launched missiles.

I have little doubt that the Soviets are making an all-out effort to develop the best possible missile defenses while our effort in that area has left much to be desired. Consequently, we have no defense whatever against missiles today, and the status of our work with antimissile missiles makes it unlikely that we will have an effective missile-defense system in the near future. Similarly, I do not think that we are spending enough effort toward major advances in antisubmarine warfare while it appears reasonable to assume that the Soviets are trying their best to cope with our Polaris submarines.

I believe that the development of adequate defenses against missiles and missile-firing submarines should be given high priority, not only because of their deterrent role but, even more so, because of the lives they would save if deterrence should fail. I am confident that we have the brains as well as the facilities in this country to solve this crucial defense problem, provided it is given the attention and funds it deserves.

With regard to our offensive capability other than strategic, I fully concur with those who call for strong conventional forces to deal with local crises and conflicts because, after all, one cannot liberate anyone with a hydrogen bomb. But I do not agree with the often-heard claim that our conventional forces have been neglected because "most of the defense moneys went to SAC and the other nuclear forces." SAC's share in the defense budget, which was thirteen percent in fiscal year 1962, continues to decline. The figures for the nation's entire strategic nuclear deterrent went from about eighteen percent of the defense budget in 1962 down to some ten percent in Fiscal Year 1965 and are likely to decrease considerably more in future budgets. Hence, over eighty cents out of every defense dollar have been available for purposes other than strategic nuclear strike capability, and that figure has been and still is going up steadily.

It is, of course, true that not all of this eighty-plus percent can be spent for limited-war capability. A large share must go to support activities, personnel services, air defense, research and development, administration, training, and the innumerable other phases essential to the management and operation of a large military establishment. But the point is that any alleged problems with our limited-war forces certainly cannot be attributed to lack of funds caused by "excessive" cost of the general-war deterrent.

I have the impression that there is some fuzzy thinking regarding the extent of conventional capability that is really required. The question should not be: How big a conventional force do we need to fight limited war, but how big a limited war do we intend to fight with a conventional force? In other words, there is little sense in arguing about requirements for conventional forces and weapons until we have decided on the maximum scope and type of armed conflict we desire or can afford to fight with them.

Would we fight another world war with the weapons of World War II and rather be defeated by superior enemy forces than make discriminating use of the best weapons we have? Would we consider another Korea—which cost us over 150,000 casualties in some three years of indecisive fighting—a mere local conflict that should again be left to the limited-war forces to settle?

Obviously, we will have to make up our minds as to what we consider a "limited war" to be fought with limited-war forces and from what point our national interests demand the use of our strategic strike forces as well as the use of some nuclear munitions. Once we have agreed on what that point should be, we must let all potential aggressors know, including the Red Chinese and their little friends. There can be no more effective deterrent against deliberate expansion of local wars than the certain knowledge on the part of our enemies that this would force us to go beyond the use of conventional weapons.

As far as our Deterrent System is concerned, it is my considered opinion that the conventional forces we now have in being are adequate for any size and type of limited war which can and should be fought with such forces. Therefore, I see no present need to expand them, especially if this is done at the expense of our capability for general nuclear war, as current trends indicate.

Moreover, considerable amounts of money have been and are being spent for the development and procurement of modern equipment for the limited-war forces. This is a wise and necessary investment, and I hope that this modernization process will be continued.

In particular, I would like to see the addition of one or more nuclear-powered aircraft carriers which I am convinced would immensely strengthen our limited-war capability as well as our over-all Deterrent System. While the primary role of carriers is their leading part in local crises and conventional conflicts, they also have an important capability for nuclear war which is utilized effectively in the Single Integrated Operational Plan of the JSTPS. (The opposite is true for SAC whose primary mission is deterrence of nuclear war but which also has a secondary or supporting capability for conventional and limited war.) A nuclear-powered carrier, which in an emergency can stay at sea for very extended periods of time and has many other operating advantages, would be especially well suited for this dual role and, therefore, would greatly enhance the striking power and versatility of our carrier fleet.

I also feel that the moneys expended for providing the Army with modern tactical aircraft are well spent as long as this does not lead to unnecessary and harmful duplication of the tactical air missions of the Air Force and Navy. The Army requires certain aerial functions over which it should have direct control as they are essentially extensions of operations on the ground. On the other hand, aerial support of ground troops—strafing of enemy concentrations, bombing of fortifications, interdiction of supplies going to the front, and maintenance of air superiority—is and should remain the role of the Tactical Air Command of the Air Force and, where in range, of the Navy's carrier-borne aircraft.

The semantics involved in trying to resolve the conflicts between the expanding tactical role of Army aviation and that of the Air Force and Navy fighter-bombers must be rather confusing to the public. This confusion is compounded if, in addition, it is attempted to define the difference between *tactical* and *strategic* air missions, and I think that it was a serious mistake to ever establish this distinction. When fighter-bombers attack strategic targets—military installations, marshalling yards, supply depots, industrial complexes—hundreds of miles deep in enemy

(Continued on following page)

territory, they are no longer carrying out their primary mission of close-in ground support but are conducting strategic missions. I maintain that such missions can be accomplished better, more economically, more effectively, and safer by long-range strategic aircraft operating from bases far beyond the reach of the enemy.

But all these problems really are not as serious as they may seem to the people directly involved. They stem from the fact that, as military technology advances, capabilities of the various branches of the armed forces expand commensurately, which is bound to create some areas of overlapping functions. Therefore, it becomes necessary from time to time to redefine the roles and missions of the military services and their major components so as to keep step with changing conditions.

I feel that slow but definite progress is being made in that respect, despite the frequent criticism that there is too much "unnecessary duplication of effort" and "wasteful competition" within the armed forces. Although some of this criticism may be justified, it is not always understood that, in an establishment as vast and complex as the military, a certain amount of duplication is unavoidable, if not actually desirable. Nor is it appreciated that there are many areas in which the individual services cooperate to the fullest degree and are engaged in joint or unified efforts. The most important examples are the unified commands, which are responsible for all combat operations in specified geographical areas, and of course the JSTPS.

It has been my experience that, as a rule, the military services have managed to work out any conflicts between them because their responsible officers realize that they all have a common objective and can best achieve this objective if they work together as a team. For this reason I do not agree with those people outside the military who insist that there is need for more, or perhaps complete, unification of the armed forces.

I feel very strongly that the identity of the individual services should be retained because there is already too much over-all centralization within our military establishment. Basic roles and missions are accomplished most effectively and economically if they are assigned to a military service which, by tradition and character, is best qualified to perform such roles and missions. Also, a reasonable degree of competition between the services is healthy because it engenders greater efficiency, progress, and *esprit de corps*. Therefore, unification should be limited to joint efforts in those areas where centralized control and management are conducive to the over-all military objective.

There are all too many people who immediately want to change an organization the moment problems arise, instead of making certain first that whatever deficiencies they may see are the fault of the organization rather than of persons in responsible positions within that organization or of the manner in which it is being used. Thus, there are persistent voices who call for radical changes in the organization of our military establishment just because they disapprove of certain policies or features which have little bearing on the effectiveness of the organization itself.

I have had ample opportunity to observe and experience directly both the strengths and weaknesses of the various concepts of military organization that prevailed throughout my military career. It is my conviction that the present organization of our military establishment is entirely adequate, at least under the conditions which exist today.

The authoritative position of the Secretary of Defense, who manages the military establishment on behalf of the Commander in Chief—the President of the United States—assures strict civilian control which I consider mandatory for any military force, and especially in a democracy. The Secretary exercises direct operational control over the unified and specified commands—the major combat elements—through the Joint Chiefs of Staff, which is composed of the military service chiefs and a military chairman. In this manner, the Secretary can count on competent professional advice and assistance in the implementation of his policies and directives. In turn, the civilian chiefs of the services—the Secretaries of the Army, Navy, and Air Force—are responsible to the Secretary of Defense for the management and administration of the services under their direction and thus provide the necessary support for the combat functions.

All of this is very well thought out and, in my opinion, has proved itself. It makes the President the Commander in Chief of the armed forces not only in name but in fact, as it should be. His powers in that capacity are clearly defined by the Constitution and properly balanced by those of the Congress which thus can make certain that the President's decisions and actions are in accord with the will of the majority of the people.

I see no way of improving on these principles of command and control even though individual citizens or groups of citizens may quarrel with some of the policies and actions of the prevailing civilian management because of political considerations, personal convictions, or a host of other reasons. That is desirable also since it leads to open discussion of all vital issues in which the people should take an active interest. If they do not approve of the manner in which their will is being carried out, it is certainly within their power to change it.

But while the basic principles of our present military organization and chain of command appear very sound, I have found that there is room for improvement in some of the methods of operation. In particular, I have noted a marked tendency toward increasing centralization of operational functions and details within various Defense Department staff offices which were established originally to deal solely with the formulation and implementation of policy, as directed by the Secretary of Defense. This assumption of operational functions has lessened the authority of the commanders in the field without lessening their responsibilities and has adversely affected both their effectiveness and prestige.

I realize that the tremendous power and implications of nuclear weapons require tight and central control over all military elements charged with the custody and potential employment of these weapons, and that this control must be exercised by the appropriate civilian authorities. On the other hand, these authorities must have enough confidence in the professional competence of military commanders to merely tell them *what* to do and not tell them *how* to do it. If the problem is one of lack of confidence, the field commander concerned should be replaced with someone who merits sufficient confidence in his professional qualifications and judgment to leave the execution of policy directives and operational orders to him.

But, again, these and related problems are of a relatively minor nature and can be easily corrected once there is mutual agreement on the desirability or need of doing something about them. What really counts is the fact that our present military establishment, on the whole, is meeting the demands of the Deterrent System and can be counted upon to accomplish its diverse missions successfully—today. We are fortunate indeed that we have the means and talent to make certain that this will be equally true in the future.—END

There are a number of approaches to every security system need. That's why Sylvania works with all possibilities.

Individual needs require different approaches to an effective security system. Only a company with the solid base of security systems experience and the "look-ahead" R & D program of Sylvania can apply the right system concept to meet each customer's primary objective: Security effectiveness at reduced cost.

We know one system can't do all things. Security systems are not just a sideline with us.

Sylvania offers a unique combination of systems capabilities, coupled with highly specialized security systems experience and a logistics support organization of worldwide resources.

All from one dependable source.

Sylvania Electronic Systems, Division of Sylvania Electric Products Inc., 40 Sylvan Road, Waltham, Massachusetts 02154.

GT&E

GENERAL TELEPHONE & ELECTRONICS

Total Communications from a single source through

SYLVANIA ELECTRONIC SYSTEMS

GT&E SUBSIDIARIES: Telephone Operating Cos. • GT&E Laboratories • GT&E International • General Telephone Directory • Automatic Electric • Lenkurt Electric • Sylvania Electric Products


U.S. AIR FORCE
USAF

THE AIRLIFTERS FROM LOCKHEED-GEORGIA

Now it's the giant C-5A ...a major advance in airlifters from Lockheed designers

Here it is: Lockheed's design for the mammoth C-5A military transport, developed by America's leading airlift team.

It's twice the size and years ahead of today's most modern airlifter. Feature by feature, it matches the challenge of greatly increased size, weight and range with unprecedented reliability, adaptability and economy. A total airlifter, in every sense of the word, Lockheed's C-5A design has the ruggedness and simplicity so vital to the Air Force's global military mission. Yet it represents a major step forward in giant aircraft technology.

Lockheed-Georgia Company, the world's most experienced cargo aircraft developer, is ready to progress the C-5A program under the most advanced systems management techniques. Dedicated to bettering its records for beating schedule and performance requirements will be the skilled organization that produced the two planes that are now the mainstays of America's airlift might . . .

C-130 Hercules—rugged, land-anywhere propjet workhorse that built the nation's military logistics capability—an aircraft with unsurpassed safety record in eight years' operation throughout the world.

C-141 StarLifter—new fanjet cargo-troop carrier, most dramatic advance to date in MATS aircraft modernization program. The C-141 has been ahead of schedule all the way, from start of production to delivery, and is the first military aircraft to receive concurrent FAA certification as a commercial airfreighter.

No company knows airlift like Lockheed-Georgia Company, Marietta, Georgia: A Division of Lockheed Aircraft Corporation.

LOCKHEED

THE BULLETIN BOARD

News and Comment about Air Force People . . .

By Jackson V. Rambeau

AFA DIRECTOR OF MILITARY AND INDUSTRIAL RELATIONS

A Delay—and an Oversight

Secretary McNamara's plans for merging the Air Reserve Forces were still under wraps as this was written. His proposals had been expected to be announced by mid-January. Latest indication, however, is that he now may wait to see how Congress reacts to the Army Reserve-Guard merger before he brings up his pattern for the air side. If Congress buys the Army plan, the reasoning goes, it will be less prone to argue over a similar merger for the Air Reserve Forces. To introduce the air plan before the Army proposal is carried out would only provide additional—and, as we've noted here previously, more potent—ammunition to those who oppose any merger of Guard and Reserve.

Meanwhile, it now appears that the Defense Department just simply ignored 354 Air Reserve squadrons with 17,000 men when it hastily rubbed out the Reserve recovery program. The 354 squadrons are nonpay-status training units which had been attached to recovery groups for administration and used their facilities for meetings. The Air Force has already picked up recovery unit desks and filing cabinets and is relinquishing office space. In some cases, training squadron records were simply dumped on the floor.

If it was Secretary McNamara's intention to do away with these units, it was uncharacteristic of him not to claim credit for these manpower "savings" when he abolished the 8,000-man recovery program. But it is no credit to USAF, or CONAC either, that they failed to make provision for the training units as they closed out recovery facilities.

AFA's President Jess Larson, in a letter to Air Force Secretary Eugene M. Zuckert, has urged that the Air Force retain these units and members.

"Because both the monetary and physical resources needed to support these units is small," Mr. Larson said, "it would appear that the continuance of this valuable pool of Ready Reserve manpower would be a sound and wise investment. . . . Furthermore, the continuance of this program would provide a means whereby the majority of the 8,000 individuals who have struggled so long to make the recovery program function could remain active on a nonpay-status in the Reserve program. . . .

"These 25,000 citizen airmen involved can contribute significantly to the Air Force mission in peacetime through their community relations efforts, and certainly could be an invaluable source of manpower for emergency augmentation, or for use as fillers."

The Air Staff is reported to be working on a reply to Mr. Larson, which entails coming up with some plan to keep the individuals concerned in a ready status. For a starter, we suggest the units be invited to meet in national Guard or Reserve armories, located in almost every community. Joint use agreements provide that any Reserve Forces unit may use armory facilities on a nonreimbursable basis upon arrangement with the armory's senior unit commander.

Contrary to widespread rumors, the mobilization assignee program will remain stable—and possibly increase.

Slugging It Out

As the House and Senate Armed Services Committees get down to business in Washington, they are exhibiting a strong mood to reclaim the congressional prerogative as set forth in the Constitution to determine the requirements of the armed forces, which in recent years has more and more been relinquished to the President, the Budget Bureau, and the Secretary of Defense.

A key figure in establishing the new mood in Congress is Rep. L. Mendel Rivers of South Carolina, new Chairman of the House Armed Services Committee, whose views on the subject were published in this magazine's January issue.

Secretary McNamara was expected to be confronted with the new mood in February when he was to present his military posture statement to the Armed Services Committees of both House and Senate.

He himself has furnished new ammunition to his congressional critics—in his plan to merge the Reserve Forces, in his insistence that the US has no present need for a follow-on manned bomber, in his decision to close many military bases, and in neglecting a military pay raise.

Mr. McNamara faces a head-on collision with Congressman Rivers on at least two of these points—the pay raise and the manned bomber. Mr. Rivers insists he will introduce a bill calling for about a ten percent military pay boost, though funds in the President's budget are adequate to cover it. And he has announced his in-

(Continued on page 79)

President Johnson congratulates Gen. Curtis E. LeMay after awarding him the Distinguished Service Medal in White House ceremony Feb. 1, marking General LeMay's retirement as USAF Chief of Staff. That afternoon, General LeMay was honored with a review and reception at Andrews AFB, Md.

—Wide World Photos

WEEKLY ISSUES OF

Air Force Times

Plus your FREE copy of
"Armed Forces Ranks,
Pay and Allowances"

For Only

$4.95

DETACH HERE BEFORE MAILING

AIR FORCE TIMES
2201 M Street, N.W.
Washington, D. C.

Gentlemen:

Please enter my subscription for 35 issues of AIR FORCE TIMES at the special rate of $4.95. Also, as part of this offer, I understand that you will send me a *FREE* copy of "Armed Forces Ranks, Pay and Allowances".

☐ *My payment is enclosed* ☐ *Please bill me*

NAME_____ RANK_____
(please print)

ADDRESS_____

_____

_____

*Signature:*_____

Free

with your subscription to

Air Force Times

"ARMED FORCES RANKS, PAY AND ALLOWANCES"

Subscribe to AIR FORCE TIMES now. Receive 35 weekly issues for just $4.95 — a *40% saving* under the newsstand price — and you will also receive — as an extra bonus — a copy of "Armed Forces Ranks, Pay and Allowances" *at no extra cost.*

This handy booklet contains up-to-date tables on pay and allowances for all armed forces personnel . . . from E-1's to O-10's. In an instant, it will show you just what the 1964 pay bill means to you in terms of your present and future Air Force career.

DETACH HERE BEFORE MAILING

FIRST CLASS
PERMIT NO.
33553
Washington, D. C.

BUSINESS REPLY MAIL

No postage necessary if mailed in the U.S.A. or at any APO or FPO

Postage will be paid by:

Air Force Times

2201 M Street, N.W.
Washington, D. C. 20037

To Air Force career men
who shouldn't have to wrestle with this problem . . .

Does it 'bug' you sometimes, trying to guess what's ahead in your AF future?

No wonder. The aero-space field is moving so fast it can change over night. And your part in America's defense effort is constantly subject to the fluid international climate. Add to this the conflicting reports, changed regulations, new rules, and rumors, rumors that continually boil out of Washington. In this framework of uncertainty, how can the Air Force career man ever figure out where he stands . . . or where he's headed? There may be an answer you have been overlooking.

Here's how to take much of the guesswork out of your Air Force career . . .

Try AIR FORCE TIMES for the next 35 weeks. It's the one newspaper edited specifically for you each week in Washington, D. C. And its main function is to supply you with reliable information for making career decisions.

Practically every day some rule change is discussed . . . or a new regulation proposed . . . or a top official makes a statement. Any of them might *seem* to bear on your future; and they all become grist for the rumor mill. But that's when the resources of AIR FORCE TIMES serve you best.

The TIMES editors, who bird-dog the halls of Congress and the Pentagon, have a knack of slicing through the doubt and confusion, taking the distortion out of service news. They uncover the trends that can help or hinder your personal progress . . . and enable you to evaluate the cold facts in terms of your own career goals.

Week after week, you'll find straight-forward answers to questions concerning your pay — your present and future assignments — your promotion prospects — your outlook for the future.

In the next 35 weeks AIR FORCE TIMES will be answering vital questions like these:

- *What does the recent consolidation of the Reserves and National Guard mean to you?*
- *Are further closings of military installations in the offing?*
- *Will Congress approve another service pay hike this session?*
- *What new educational opportunities are open to you?*
- *Are any changes expected in family medical care, commissary privileges or other service benefits?*
- *What's likely to result from the House study on military retirements? Will special inducements be offered to those passing up the 20-year retirement option?*

FREE —
AN EXTRA BONUS FOR PROMPTNESS!

Send in your order right away, and you'll also receive a free copy of **"Armed Forces Ranks, Pay and Allowances"** — a handy pocket guide that shows you just what the 1964 pay bill means to you in terms of your present and future career in the service.

ALMOST LIKE A HOME-TOWN NEWSPAPER

Beyond the important career information, AIR FORCE TIMES also keeps you posted on your friends in the Air Force — tells who's being transferred, promoted, decorated or retired — lets you know about recreational and social activities on bases all over the world.

It contains features on travel, investments, hobbies, sports, preparation for retirement — even a Women's Section for Air Force Wives . . . with homemaking tips, fashions and society news.

ORDER YOUR PERSONAL SUBSCRIPTION NOW!

Your own fresh, clean copy each week — no matter where you're assigned — is the most convenient way to receive AIR FORCE TIMES. You can spend as much time as you like with it . . . cut out articles . . . keep the paper available for other members of the family.

USE ATTACHED CARD FOR BARGAIN RATE
35 weeks for only $4.95.

That's only 14½¢ a copy . . . 10¢ less than you'd pay at the PX, and a lot more convenient, too. No need to send cash. SIMPLY DETACH AND MAIL THE ACCOMPANYING CARD.

AIR FORCE TIMES • *2201 M STREET, N.W. • WASHINGTON, D. C. 20037*

TOGETHERNESS

make a great motor tachometer

Small: .75" diam x 1.241" length
T/J: 90,000 rad/sec²
Output: .3V/1000 rpm
Nulls: .015V max
Power Consump. <3W/phase

Look at these parameters in a "synchro size" size 8 *full drag cup* motor rate tachometer.

We chose a Clifton motor with good torque (.275 in-oz), low power consumption (3 watts/phase) and high acceleration (120,000 rad/sec²), and added a tachometer with exceptionally high output for length. Combining them produced a tachometer with the lowest inertia in the industry for the size, output and torque.

One further ingredient was added. This component (and our whole, new line of servo motors and tachometers) is produced by a quality-minded company deeply experienced in the design and manufacture of rotating components. Look to CLIFTON for leadership in the servo motor and tachometer field.

Clifton Precision Products, Division of Litton Industries, Clifton Heights, Pa., Colorado Springs, Colo.

cppc **CLIFTON** PRECISION PRODUCTS
DIVISION OF LITTON INDUSTRIES

tention to form a new subcommittee in his Committee to look into the need for new manned aircraft—interceptors, V/STOL fighters, and cargo planes, as well as bombers.

Mr. McNamara has antagonized many congressmen, too, in a couple of ways that they can't openly criticize but which still makes them mad—by prohibiting individual services from offering military travel to congressmen, except under highly restrictive conditions, and by summarily dropping those with Reserve commissions from the Ready Reserve.

The Secretary has met congressional criticism before, and usually won. Invariably he has the facts and the figures to back up his arguments.

One senior House member put it this way in a recent interview:

"The truth is that we've lost the initiative to the planners and computer programmers down at the department, and that even our ability to respond to their proposals has been severely circumscribed. We can't make them spend the money for something they don't want, so about all that's left is to obstruct them on something they do want. And that's usually political suicide."

The outcome will be interesting.

Top Echelon Promotions

In the wake of General LeMay's retirement and advancement of Gen. J. P. McConnell to USAF Chief of Staff, several changes have occurred in the Air Staff lineup, entailing nominations by President Johnson of one officer to general and three to lieutenant general.

Lt. Gen. William H. Blanchard becomes the new Vice Chief of Staff, carrying with it nomination for four-star rank. Succeeding him as Deputy Chief of Staff/Plans and Operations is Lt. Gen. K. K. Compton, who had been Inspector General.

Lt. Gen. William H. Blanchard has been appointed USAF Vice Chief of Staff and nominated by the President for promotion to full general.

Named Assistant Vice Chief of Staff is Lt. Gen. Hewitt T. (Shorty) Wheless, who had been Deputy Chief of Staff/Programs and Requirements.

Lt. Gen. Hewitt T. Wheless moves into the post of Assistant Vice Chief of Staff, now elevated to three stars. His former position as DCS/Programs and Requirements goes to Maj. Gen. R. J. Friedman, nominated for lieutenant general.

USAF's new Inspector General is Maj. Gen. William K. Martin, formerly Assistant Vice Chief of Staff, also nominated for lieutenant general.

The third USAF officer nominated for three-star rank is Maj. Gen. James V. Edmundson, DoD's Director of Inspection Services and former Seventeenth Air Force Commander in USAFE.

Honor Under Stress

Gen. Thomas D. White, USAF (Ret.), former USAF Chief of Staff, has been named by Secretary Zuckert to head a five-man committee to review "fundamental programs" of the US Air Force Academy, including its honor system and its role in intercollegiate athletics.

The panel is to look into underlying causes of academic cheating which brought resignations of 105 cadets from the Academy's 2,600-man corps.

(Continued on following page)

Lt. Gen. K. K. Compton, who had been USAF Inspector General, replaces General Blanchard in the post of Deputy Chief of Staff/Plans and Operations.

Maj. Gen. Robert J. Friedman, succeeding General Wheless as DCS/Programs and Requirements, has been chosen by the President for three stars.

Also nominated for promotion to lieutenant general is Maj. Gen. William K. Martin, who moves from Asst. Vice Chief of Staff to Inspector General.

Named to the committee with General White were Prof. Hardy Dillard of the University of Virginia law school; Lt. Gen. Joseph Nazzaro, SAC Vice Commander in Chief; Dr. Robert L. Stearns, former President of the University of Colorado; and Charles B. Thornton, President of Litton Industries.

One aspect of the honor code which has come in for public criticism is that which requires a Cadet to inform on any colleague he may believe guilty of cheating. No Cadets who may have violated this provision of the code are among the 105 who have resigned. Their cases are pending before the Cadet honor board.

SSgt. Carl E. Carr, who won first place and $1,000 in Freedom's Foundation letter-writing contest, meets AF Secretary Eugene M. Zuckert after participating in Presidential Inaugural.

"Conflict" Can Be Painful

Top order of business in the first meeting of AFA's Retired Council this year will be the Conflict of Interest laws. In particular, the Council will study implications of a recent Comptroller General ruling which cost Brig. Gen. Laurence B. Kelley, USAF (Ret.), $16,000 in retired pay for representing his company with the Air Force, even though he himself sought no contracts. The Comptroller General's opinion was doubly painful for General Kelley. His employer, to avoid jeopardizing the firm's defense business, promptly fired him.

• • •

STAFF CHANGES . . . **Lt. Gen. William H. Blanchard,** from Dep. C/S, Plans & Operations, USAF, to Vice C/S, USAF, Hq. USAF, Washington, D. C., replacing Gen. John P. McConnell, and nominated for promotion to general . . . **Lt. Gen. Keith K. Compton,** from The Inspector General, USAF, to Dep. C/S, Plans & Operations, USAF, replacing Lt. Gen. William H. Blanchard . . . **Maj. Gen. James V. Edmundson,** Dir. of Inspection Services, Office, Asst. Secy. of Def., nominated for promotion to lieutenant general with no assignment change . . . **Lt. Gen. Paul S. Emrick,** from Dir., Plans and Policy, J-5, Joint Staff, Joint Chiefs of Staff, Washington, D. C., to Chief of Staff, Pacific Command, Pearl Harbor, Hawaii, replacing Lt. Gen. Verdi B. Barnes, USA . . . **Lt. Gen. James Ferguson,** Dep. C/S, R&D, assigned additional duty as Senior USAF member on the Military Staff Committee of the United Nations.

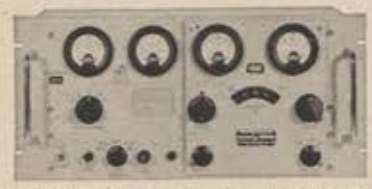
Maj. Gen. Robert J. Friedman, from Asst. Dep. C/S, Programs and Requirements, USAF, to Dep. C/S, Programs and Requirements, Hq. USAF, Washington, D. C., replacing Lt. Gen. Hewitt T. Wheless, and nominated for promotion to lieutenant general . . . **Brig. Gen. William D. Greenfield,** from Asst. DCS/Operations, ADC, to DCS/Operations, ADC, replacing Maj. Gen. Thomas K. McGehee . . . **Brig. General William G. Lee, Jr.,** from Asst. to The IG, USAF, Hq. USAF, Washington, D. C., to Dir. of Plans & Programs, Hq. AFLC, Wright-Patterson AFB, Ohio . . . **Brig. Gen. William C. Lindley, Jr.,** from Cmdr., 3510th Flying Training Wg., ATC, Randolph AFB, Tex., to DCS/Flying Training, Hq. ATC, Randolph AFB, Tex., replacing Maj. Gen. Neil D. Van Sickle . . . **Brig. Gen. John L. Locke,** from Dep. Dir. of Military Personnel, Office, DCS/Personnel, Hq. USAF, Washington, D. C., to Chief, Air Section, MAAG, Iran.

Maj. Gen. William K. Martin, from Asst. Vice C/S, USAF, to The IG, USAF, Washington, D. C., replacing Lt. Gen. Keith K. Compton, and nominated for promotion to lieutenant general . . . **Maj. Gen. Thomas K. McGehee,** from DCS/Operations, ADC, Ent AFB, Colo., to Cmdr., 29th NORAD (CONAD) Region, Hq. 29th Air Div. (SAGE), ADC, Richards-Gebaur AFB, Mo., with additional duty as Cmdr., 29th Air Div., replacing Maj. Gen. Dolf F. Muehleisen, who is retiring . . . **Brig. Gen. Robert L. Petit,** from Dep. Cmdr., 3d AF, USAFE, to Dep. Dir. of Operational Requirements for Weapons Effect Testing, Office, DCS/Programs & Requirements, Hq. USAF, Washington, D. C.

Brig. Gen. Oran O. Price, from Dep. Dir. for Civil Engineering Operations, Office, DCS/Programs and Requirements, Hq. USAF, Washington, D. C., to Dep. Dir. for Construction, Office, DCS/Programs and Requirements . . . **Maj. Gen. Neil D. Van Sickle,** from DCS/Flying Training, ATC, Randolph AFB, Tex., to Cmdr., USAF Recruiting Service, Wright-Patterson AFB, Ohio, with duty station to continue at Randolph AFB, Tex. . . . **Lt. Gen. Hewitt T. Wheless,** from DCS/Programs and Requirements, USAF, to Asst. Vice C/S, USAF, Hq. USAF, Washington, D. C., replacing Maj. Gen. William K. Martin.

PROMOTIONS . . . To **major general:** Irving L. **Branch,** Duward L. **Crow,** Leo F. **Dusard,** Jr., Harry E. **Goldsworthy.**

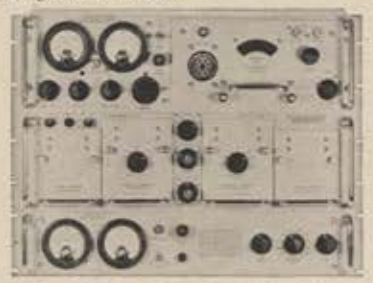
To **brigadier general:** William B. **Kyes,** Robert L. **Petit,** Richard F. **Shaefer.**
—END



- **TMR-2A:** 215 to 265 mc Tuning Range; VFO or XTAL controlled. FM or PM.
  FM demodulators—Wideband, Narrowband, Phase lock.
  Phase Demodulators—Short loop.
  Pre-D: Plug-in record and playback modules.

- **TMR-5A:** 55 to 2400 mc; Tuning Units VFO or XTAL controlled. AM/FM, PM.
  FM Demodulators—Wideband, Narrowband, Phase lock.
  Phase Demodulators—Short loop.

- **TMR-6:** 50 to 1000 mc; Fixed Frequency XTAL controlled RF Tuning Units. AM, FM or PM.
  FM Demodulators—Wideband, Narrowband, Phase lock.
  Phase Demodulators—Long loop.
  Pre-D: Plug-in record modules.



- **TR-101:** 100 to 2400 mc; Tuning Units VFO, XTAL controlled and Automatic Phase Control. AM, FM or PM.
  Dual Data Channels.
  FM Demodulators—Wideband, Intermediate, Narrowband.
  Phase Demodulators—Long loop, Short loop.

- **TR-711:** 100 to 2300 mc; Tuning Units VFO, XTAL controlled and Automatic Phase Control. AM, FM or PM.
  FM Demodulators—Wideband, Intermediate band, Narrowband.
  Phase Demodulators—Long loop, Short loop.
  Plug-in display unit or Pre-D record and playback modules, or oscilloscope.
- These receivers are compatible with TDC and DC series Diversity Combiners and the PRU-1 and PD-101 Predetection Record/Playback units. Plug-in IF bandwidth determining modules and plug-in demodulators are used in these receivers.

Other options are described in individual receiver data sheets.

DEI TELEMETRY RECEIVERS...

Technically Superior
Reliable by design
Modular for flexibility
Available now

Telemetry receivers are very important at DEI. Development and planning never stop. We consider new requirements, new components and the constant need to advance telemetry system performance. It is a rare telemetry receiving function that cannot be met by a DEI catalog receiver/module combination.

DEI receivers that have been in use for many years are updated by module changes to achieve new system characteristics. System modifications are introduced with minimum interruption when the DEI modular approach is used.

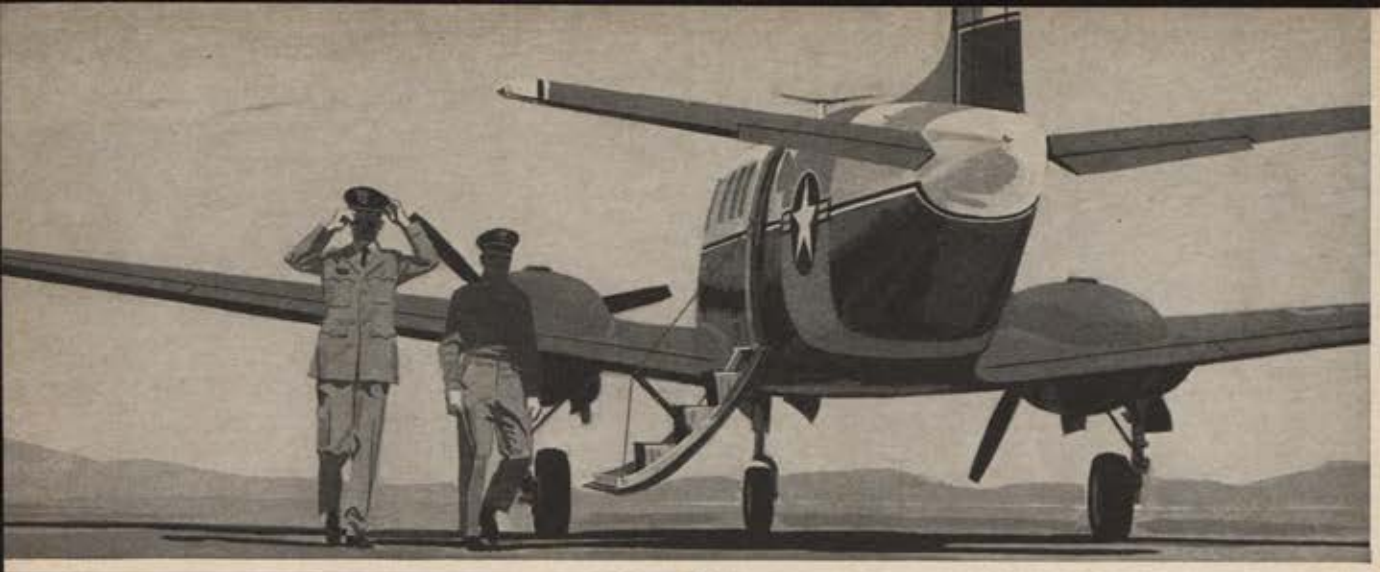
For your telemetry applications, consult DEI, the company where receivers and receiving systems are constantly being improved.

Write or call DEI for your copy of detailed specification sheets.

DEI
RESEARCH
DEVELOPMENT
MANUFACTURING

Defense Electronics, Inc.
Rockville, Maryland

ROCKVILLE, MD. (301) 762-5700, TWX: 302-427-4660; **SHERMAN OAKS, CALIF.** (213) 872-2870, TWX: 213-783-2742; **COCOA, FLA.** (305) 632-5400, TWX: 305-632-5442; **WILLOW GROVE, PA.** (215) 659-5051; **INT'L.**, ROCKVILLE, MD.; **CABLE:** DEIUSA



1. Short, rough airfields are no problem to the U-8 shown at the top, with its 340 hp supercharged engines.

2. Two 380 hp Lycoming supercharged fuel injection engines power this U-8 to speeds of 252 mph.

Which of these "off-the-shelf" U-8 aircraft

Now the Beechcraft U-8—proved rugged and reliable in world-wide military service—is available in 3 power choices and performance capabilities:

Within the family of Beechcraft U-8 aircraft, there is one to fit your specific needs . . . personnel transport, high-priority cargo, aerial ambulance movements, or turboprop and jet transition.

Savings can run into thousands of dollars when pilots maintain instrument proficiency on a U-8. It can hold all equipment normally found in larger military aircraft.

Choose speeds from 239 to 280 mph . . . maximum ranges from 1,220 to 1,565 miles . . . useful loads to 3,800 pounds.

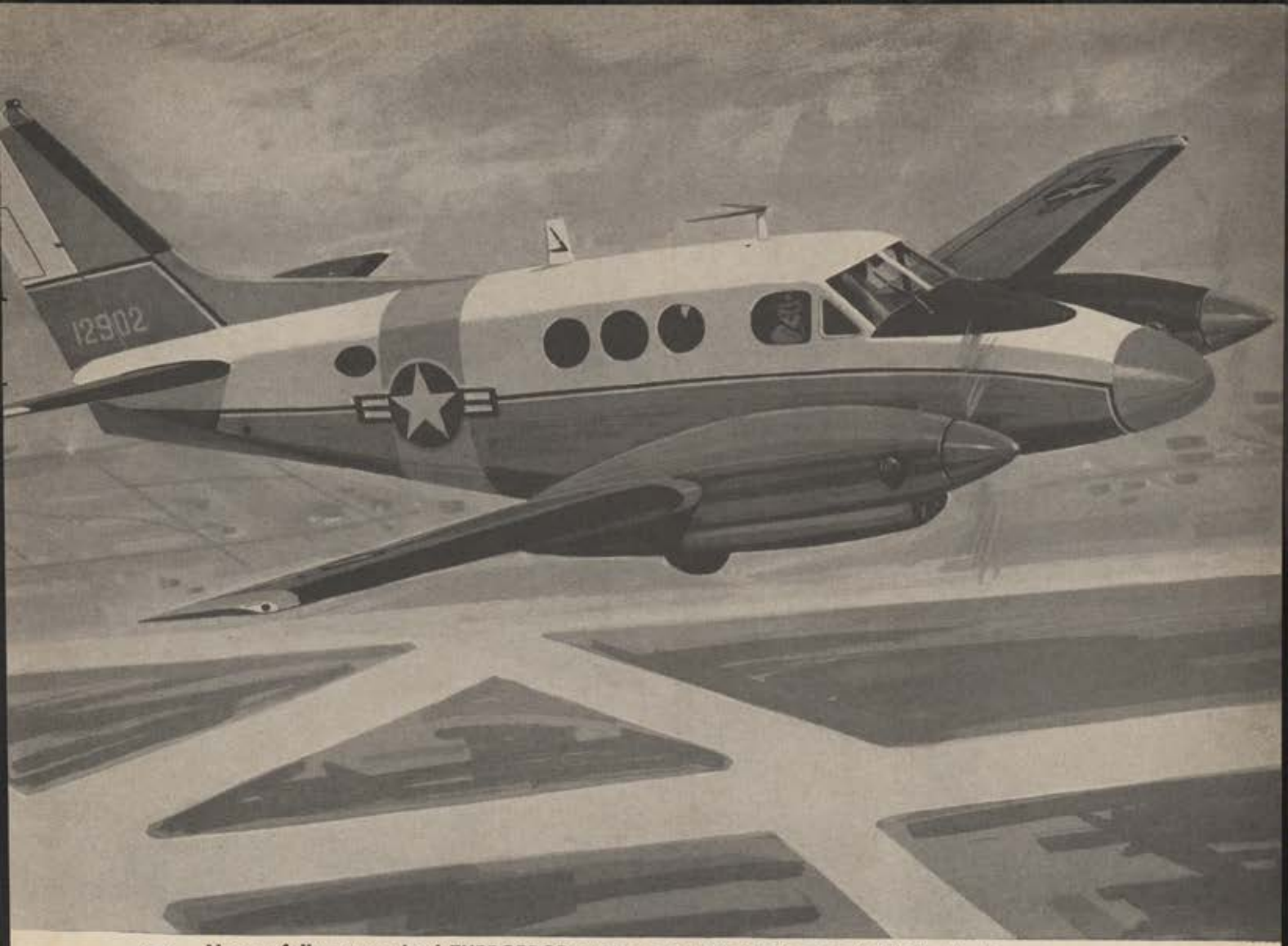
All 3 of these rugged U-8 aircraft can operate from the shortest, toughest airfields — and all are built as only Beechcraft builds airplanes.

U-8 No. 1, above, has proved its capabilities all over the world in the most demanding kind of service.

U-8 No. 2 gives you even greater capability, with more speed, more range and more payload.

U-8 No. 3, Beechcraft's fast new TURBOPROP, has a pressurized cabin that lets you fly *over* the weather to meet deadlines, make schedules regardless of the weather.

This much high-priority cargo can be loaded into a Beechcraft U-8 when seats are removed. Or use cabin for conference seating for 4-5; high-density seating for 11.



3. **Now a fully pressurized TURBOPROP** has been added to the Beechcraft U-8 family of military aircraft. It flies "on-time" missions *over* the weather—at speeds to 280 mph.

will fit your mission support requirements best?

Keep your pilots proficient on instruments, too, at low cost with a Beechcraft U-8. Each has room for all the nav/comm equipment normally found on much larger aircraft.

Keep in mind, also, that the Beech service organization is worldwide. Parts and service are always near.

"Off-the-shelf" availability of these three U-8 models makes them even more desired by military commanders. Why not write for more facts now. Address: Beech Aerospace Division, Beech Aircraft Corp., Wichita, Kansas, 67201, U. S. A.

Beech *Aerospace Division*

BEECH AIRCRAFT CORPORATION • WICHITA, KANSAS 67201

Beech Aerospace Division projects include R & D on manned aircraft; missile target and reconnaissance systems; complete missile systems; space systems management; programs pertaining to liquid hydrogen propellants and cryogenic tankage systems; environmental testing of missile systems and components; and GSE.

HELPING BUSINESS GROW FASTER: Only Beechcraft offers such a complete line of planes with so much speed, range, comfort and quiet to help business multiply the money-making decisions that each top man can make. That's how thousands of Beechcrafts have paid for themselves.

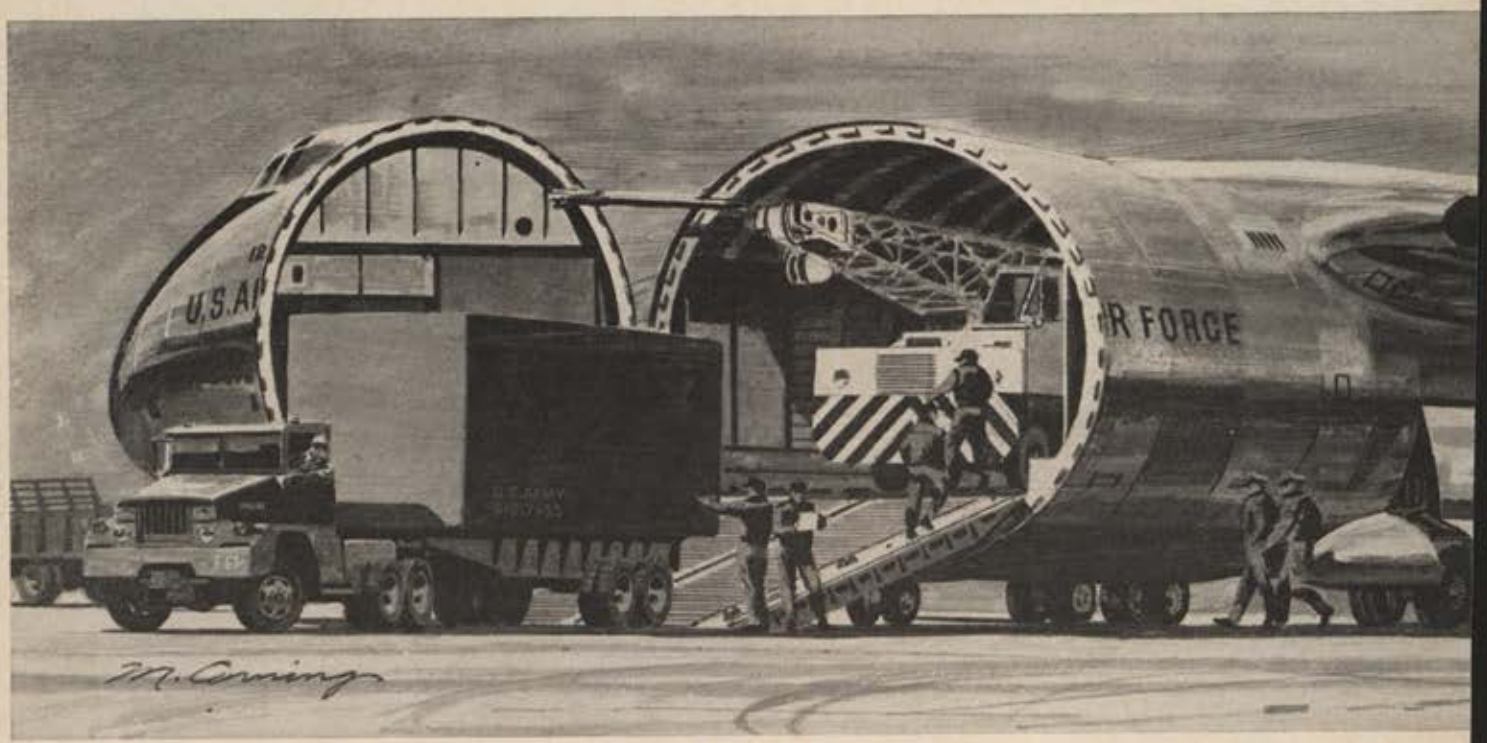
EXECUTIVES: Write today for the booklet, "Answers to the 19 Questions Most Frequently Asked About Business Flying." It could point the way to major new profits for your company. Address Beech Aircraft Corp., Marketing Services Dept., Wichita, Kansas 67201, U. S. A.

We've been doing our homework on heavy logistics systems

We studied our C-124 for front-end loading

...analyzed the tail-loading of our C-133

...checked the giant transport knowledge we gained in designing the C-132



A GIANT NEW CARGO JET for the armed services is under study at Douglas. Its design includes the speed, range and load-carrying ability to put a fully-equipped, ready-for-action combat force into the field at any distant trouble spot within hours. Its cavernous interior, which can be quickly loaded and unloaded from both nose and tail sections, will accommodate battle-ready equipment as well as the personnel to use it.

...reviewed our extensive DC-8 jetliner experience

...what we learned from the DC-8F about jet cargo hauling

...and about building even simpler, more reliable jets from the DC-9

We figured out management, engineering and manufacturing procedures that will provide the utmost in high performance and reliability for every system and component ...while doing the job at minimum time and cost. Then we started to test: built a giant mockup to make sure everything would fit and to check loading and unloading methods and times; tested every possible configuration in wind tunnels; flight-tested advanced wing and landing-gear designs.

We're intensely occupied with our homework on heavy logistics systems—like the one at the left—because we want all of the answers.

DOUGLAS AIRCRAFT DIVISION

JUNE!
PARIS!
THE AIR SHOW!
AF/SD INTERNATIONAL WILL BE THERE!

And advertisers in Air Force/Space Digest INTERNATIONAL will be there too . . . there 3,000 times . . . telling the most important visitors at the Paris Air Show all about their companies, their products, and their capabilities.

The 3,000 copies at the Show are an EXTRA . . . a BONUS, in addition to the regular AF/SD INTERNATIONAL circulation that now reaches the top 10,000 military and civilian leaders of the Free World OUTSIDE of the United States.

Yet you get this BONUS circulation at regular advertising rates!

And if you are an exhibitor at Paris, remember the June "Paris Air Show" issue will reach its regular readers in Europe well before the show . . . time enough to stimulate the world's most important international aerospace customers to visit your exhibit.

Closing date . . . April 15. To reserve advertising space, or for additional media information, call or write Advertising Headquarters, AF/SD INTERNATIONAL, 880 Third Avenue, New York, N. Y. 10022 (Tel. 752-0235) or the nearest regional office at Los Angeles (Tel. 878-1530), Des Plaines, Ill. (Tel. 296-5571), or San Francisco (Tel. 421-0151).

AFA NEWS

CHAPTER OF THE MONTH

Lincoln Chapter, Neb., Cited for

effective programming designed to acquaint the community with all phases of aerospace technology and development.

AFA's **Lincoln Chapter, Neb.,** recently held its **Sixth Annual Aerospace Science Clinic,** planned for Lincoln school youth, University of Nebraska students, and interested citizens.

During the Clinic's eight-day operation, **more than 10,000 persons** attended and had their attention directed to the nation's dynamic program of space exploration.

Planners of this outstanding program were: **Dr. Frank E. Sorenson,** Chairman, Department of Educational Services, University of Nebraska, Chapter Secretary and Chairman of its Airpower Committee; **Dr. Steven N. Watkins,** Superintendent of Lincoln Schools, Chapter Vice President and Chairman of its Education Committee; **Dale Rathe,** Coordinator, Lincoln Junior High School Curriculum; and **Tyler Ryan,** Chapter President.

The Science Clinic staff included **the Hon. Eugene M. Zuckert,** Secretary of the Air Force; **Dr. J. D. Tebo,** Head, Technical Relations Department, Bell Telephone Laboratories; **Robert Helton,** NASA Spacemobile lecturer; **Lt. Col. David O'Hara,** Information Officer, AF Flight Test Center, AFSC, Edwards AFB, Calif.; **Lt. Col. William Shimonkevitz,** Acting Professor of Air Science, University of Nebraska; **Capt. Joe Engle,** X-15 pilot, named by AFA as the Outstanding Junior Officer in the USAF for 1964, and more recently named one of Ten Outstanding Young Men in America for 1964 by the Junior Chamber of Commerce; and **Dr. Steven N. Watkins.**

The program consisted of the following:

- A **general session at the University of Nebraska** for 5,000 university students, faculty, and interested citizens. Secretary Zuckert spoke at this initial session.
- Sixteen general sessions at **elementary and junior high schools** featuring Dr. Tebo or Mr. Helton as the speaker.
- A general session at Nebraska University's Love Library Auditorium, attended by more than **800 AFROTC Cadets** and featuring Captain Engle as the speaker.
- An **Aerospace Science Clinic Dinner** at the Hotel Cornhusker with Dr. Tebo as the featured speaker.
- A **Sertoma Club Aerospace Luncheon** at the Lincoln Hotel for Club members and their guests. Featured speaker was Colonel O'Hara.
- An **Angel Flight Aerospace Meeting** at the Nebraska Union for Angel Flight members and guests, featuring Colonel O'Hara and Captain Engle.
- The final session of the Clinic was an **AFA Honors Banquet** at the Hotel Cornhusker, again with Captain Engle as speaker. Dr. Watkins reported to the community on the highly successful aerospace science program carried out during the week. **Col. Edwin Garrison,** Commander, 818th Strategic Aerospace Division, Lincoln AFB, introduced the three outstanding airmen of the quarter and their wives. The special guests for the evening, Colonel O'Hara and Captain Engle, were awarded plaques in recognition of their outstanding contributions to the Air Force and the country's aerospace program. **Tyler Ryan,** Chapter President, made the presentation.

During his visit to Lincoln, Secretary Zuckert was guest of honor at a luncheon hosted by **Clifford M. Hardin,** Chancellor of the University of Nebraska, and guest speaker at the **Dining-In** held in his honor at the Lincoln AFB Officers' Open Mess.

Among the other distinguished guests not already mentioned were **John Lang,** Administrative Assistant to the Secretary of the Air Force; **Lt. Gen. David Wade,** Commander, Second Air Force, Barksdale AFB, La.; **Brig. Gen. Thomas Corbin,** Office of Legislative Liaison, Office of the Secretary of the Air Force; **Brig. Gen. William Lindley,** Commandant, AFROTC, Maxwell AFB, Ala.; the **Hon. Frank B. Morrison,** Governor of

(Continued on following page)

Secretary of the Air Force Eugene M. Zuckert meets informally with AFROTC Cadets from the University of Nebraska during the Aerospace Science Clinic conducted recently by AFA's Lincoln, Neb., Chapter. Seated at table is Brig. Gen. William C. Lindley, Commandant, AFROTC, of Maxwell AFB, Ala.

Among many notables who attended Ak-Sar-Ben Chapter's dinner for Gen. Curtis E. LeMay, center, were, from left, Toastmaster A. F. Jacobson, Capt. Eddie Rickenbacker, AFA's Art Storz, and Gen. Carl Spaatz. (See details, next page.)

In another view of distinguished guests at Ak-Sar-Ben Chapter's dinner honoring USAF Chief of Staff, General LeMay is shown with Lt. Gen. Jimmy Doolittle, Sen. Roman L. Hruska, Eddie Rickenbacker, and Sen. Carl T. Curtis.

Members of the Aerospace Education Foundation's Advisory Council are pictured during a recent tour of Cape Kennedy, Fla., as guests of Maj. Gen. Vincent G. Huston, Commander, Air Force Eastern Test Range, Patrick AFB, Fla.

Nebraska; and **Maj. Gen. Lyle A. Welch,** USA, Adjutant General of Nebraska.

The success of the Clinic was due in large part to the cooperative planning of aerospace-oriented leaders at the University of Nebraska and in the Lincoln Public Schools, and, also, to the leadership and cooperation of the USAF, the Bell Telephone Laboratories, and the National Aeronautics and Space Administration.

Major sources of encouragement and financial support for the Clinic and for the continuing Nebraska program of aerospace education are the **Nebraska Department of Aeronautics and the Link Foundation.**

* * *

More than 300 friends and associates attended a testimonial dinner in Omaha, Neb., on January 25, to honor the retiring Chief of Staff of the Air Force, **Gen. Curtis E. LeMay.**

The affair, held at the Indian Hills Inn, was cosponsored by AFA's **Ak-Sar-Ben Chapter** and the **SAC Consultation Committee,** a committee made up of civilians who advise SAC officers on relations between the Air Force and the City of Omaha.

Notable among the distinguished guests who attended the glittering affair were: Nebraska's Governor **Frank B. Morrison;** the **Hon. Roman Hruska** and the **Hon. Carl Curtis,** US Senators from Nebraska; **Gen. W. F. McKee,** USAF (Ret.); **Gen. Samuel Anderson,** USAF (Ret.); **Gen. Benjamin Chidlaw,** USAF (Ret.); **Gen. John D. Ryan,** SAC Commander in Chief; **Gen. Hunter Harris,** PACAF Commander in Chief; **Lt. Gen. Ira Eaker, USAF** (Ret.); **Lt. Gen. William H. Blanchard,** new USAF Vice Chief of Staff; **Lt. Gen. K. K. Compton,** Deputy Chief of Staff for Plans and Operations; **Lt. Gen. Hewitt T. Wheless,** USAF Assistant Vice Chief of Staff; **Lt. Gen. Archie Old,** Fifteenth AF Commander; **Lt. Gen. David Wade,** Second AF Commander; **Lt. Gen. Horace Wade,** Eighth AF Commander; **Miss Jacqueline Cochran,** world-famous aviatrix; **Lee Atwood,** President of North American Aviation, Inc.; **Daniel Haughton,** President of Lockheed Aircraft Corp.; **Lyle A. Wood,** Vice President of the Boeing Co.; and **Capt. E. V. Rickenbacker,** Honorary Chairman of the Board of Eastern Airlines.

AFA was also well represented by **Dr. W. Randolph Lovelace II,** Chairman of the Board; **George D. Hardy,** National Secretary; and the following board members: **John Alison, William R. Berkeley, N. W. deBerardinis, James H. Doolittle, Ken Ellington, Joe Foss, John P. Henebry, Chess F. Pizac, Carl A. Spaatz, and Arthur C. Storz** who served as the hard working chairman of the Dinner and introduced the guest of honor.

A. F. Jacobson, President of Northwestern Bell Telephone Co., served as Toastmaster for the evening, and **The Most Rev. Daniel E. Sheehan,** auxiliary bishop of the Omaha Catholic Archdiocese, gave the invocation and the benediction.

The Ak-Sar-Ben Chapter once again outdid itself by making this the finest function of its kind.

* * *

The **Aerospace Education Foundation's Advisory Council** met at Cocoa Beach, Fla., on January 12-13, 1965. The Council is composed of some of the nation's leading educators, headed by **Dr. B. J. Chandler,** Dean of Northwestern University's College of Education.

Meeting at the Cape Colony Inn both evenings, the Council spent the thirteenth as guests of **Maj. Gen. Vincent G. Huston,** Commander, Air Force Eastern Test Range, Patrick AFB, Fla., where they were treated to a tour of the **Cape Kennedy and Merritt Island** complexes, and a briefing by officials of the **National Aeronautics and Space Administration.**

Dean Lindley J. Stiles, President, Aerospace Education Foundation, acted as Chairman in Dr. Chandler's absence, and announced the appointment of three new consultants to the Council—**Ken Ellington,** New York City, a Trustee of the Foundation and an AFA National Director; **Maj. Gen. Arno H. Luehman,** Vice Commander, Air University, Maxwell AFB, Ala.; **Col. Charles W. Head,** Director, Training Methods Division, Hq. ATC, Randolph AFB, Tex.

After several very productive meeting sessions, the Council flew to Maxwell AFB, where they were the guests of **Lt. Gen. Ralph P. Swofford,** AU Commander. The group was welcomed by General Luehman, who arranged the trip for the Council, and then spent the remainder of the day being briefed by key officials of AU Headquarters and the AU schools.

In addition to those already named, Council members on the trip included **Dr. John E. Kosoloski,** Assistant Director of the School and Program Evaluation, Pennsylvania Dept. of Public Instruction; **Dr. Earl Lindveit,** Staff Associate, American Council on Education, Washington, D.C.; **Dr. Steven N. Watkins,** Superintendent of the Lincoln Neb., schools; **Dr. James G. Allen,** Head of the University of Colorado's Department of History; **Brig. Gen. William C. Lindley,** AFROTC Commandant, Maxwell AFB, Ala.; and **Dr. Wayne O. Reed,** Deputy Commissioner of the U.S. Office of Education, Washington, D.C.

—Don Steele

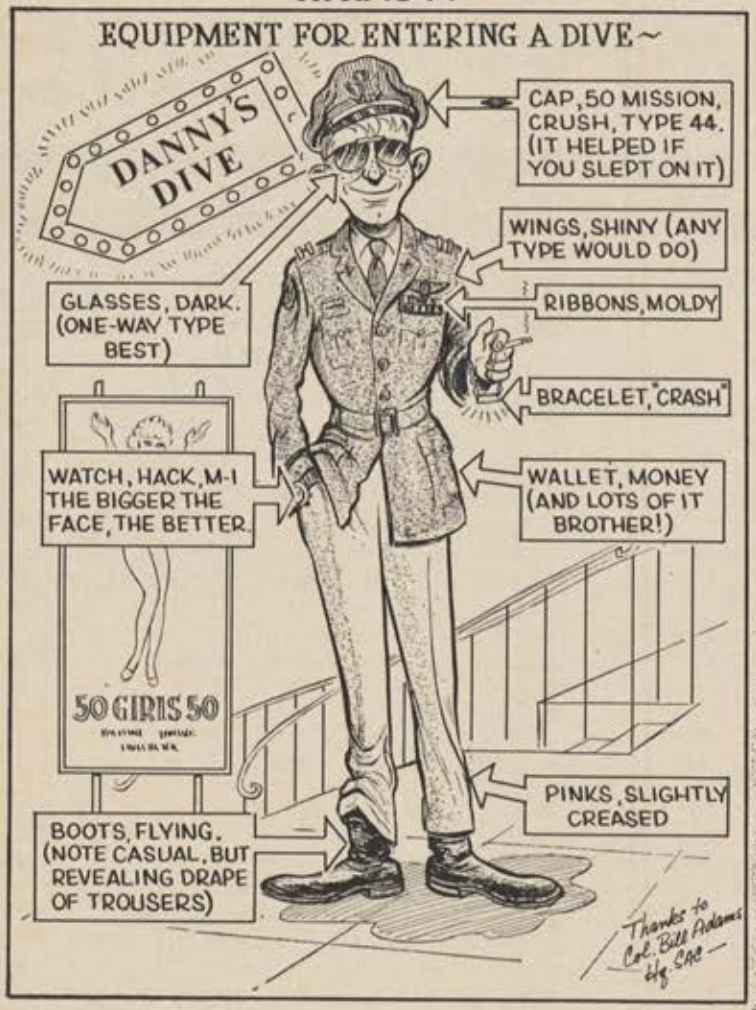
Bob Stevens'

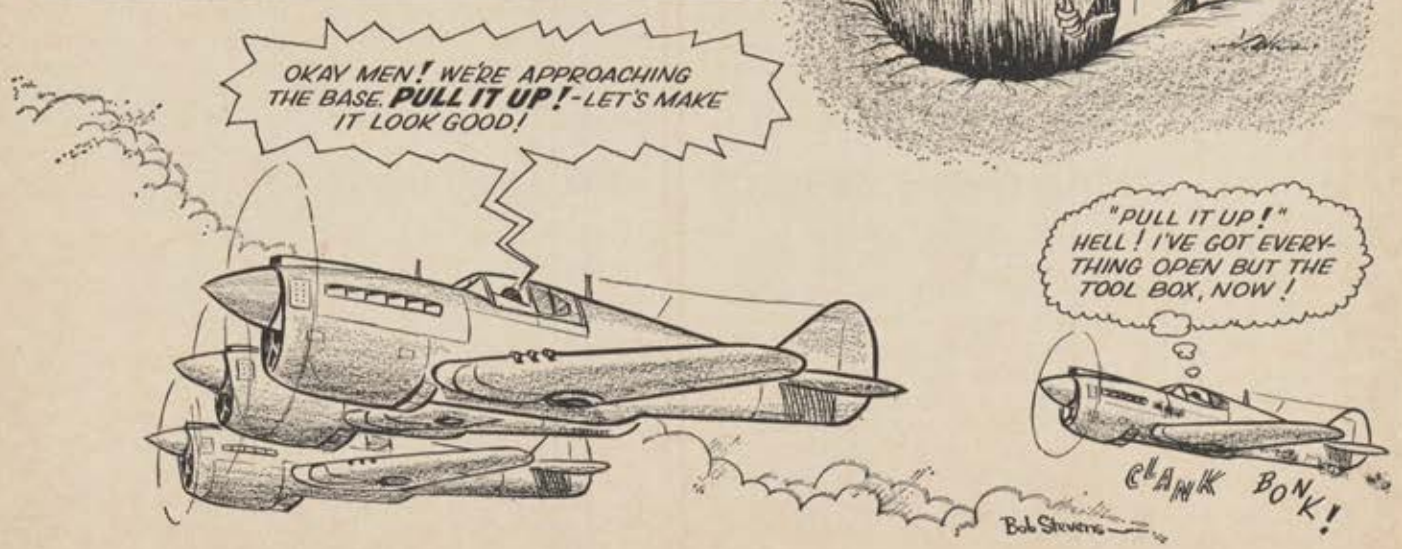
"There I was..."

Stateside duty was sometimes hard to take . . . when you'd already done an overseas tour. It was training, training, and more training. Of course, there were also the occasional forays into nearby villages to fraternize with the friendly natives. . . .

THE 'COMPLEAT' AVIATOR

circa 1944





• NEW CIVILIAN LIFE
• FLIGHT PAY
• COMPREHENSIVE

LOW COST GROUP INSURANCE

ALL AFA INSURANCE PROGRAMS ARE DESIGNED TO MEET THE KNOWN NEEDS OF ASSOCIATION MEMBERS AT THE LOWEST POSSIBLE COST. THEY ARE REVIEWED CONSTANTLY TO PROVIDE MAXIMUM BENEFITS CONSISTENT WITH SAFETY.

Death and disability can strike any family, anywhere, any time. Insurance cannot ward them off, or ease the pain when a loved one is lost or disabled. Perhaps this association with painful subjects is one reason why many families avoid thinking seriously about insurance until it is too late to avoid financial hardship.

Insurance *can* and *does* keep a family from financial trouble . . . *even from actual poverty* . . . when death or disability strikes. An adequate insurance program can keep a family together, provide a comfortable home, pay for children's education . . . even provide a few luxuries, after the necessities have been taken care of.

AFA recognizes the benefits insurance can provide, and has made them available to as many members as possible at very low cost. These programs are described briefly below, including the new AFA Civilian Group Life Insurance, now available after more than two years of analysis and development. Full and complete descriptions of any or all of these plans are available on request. Fill in and return the coupon.

CIVILIAN GROUP LIFE INSURANCE

This new program offers AFA's nonmilitary members $10,000 of needed insurance protection at the lowest cost we know of for any group term policy which offers equal benefits:

Double Indemnity is a unique feature of this plan, covering almost all accidental deaths, including death caused by aviation accident unless the insured is acting as pilot or crew member of the aircraft at the time of accident.

Coverage may be continued at low group rates to age 65, when it may be converted to any permanent plan of insurance then being offered by the Underwriter, United of Omaha, regardless of the health of the insured person at that time. Conversion prior to age 65 is also guaranteed, at the option of the insured.

The plan also provides many other benefits — waiver of premium for disability, a choice of settlement options, and a choice of convenient payment plans to fit most family budgets.

Any member of AFA, man or woman, who is not on active duty or in the National Guard or Ready Reserve, and who is between 20 and 60 is eligible, except for members who have left military status but still retain AFA Military Group Life Insurance at Group rates.

MILITARY GROUP LIFE INSURANCE

With more than 12,000 participants and more than $175,000,000 insurance in force, AFA Military Group Life Insurance continues to be the best protection for all military families. Eligibility has now been broadened to include *all* officers and enlisted men on active duty, in the National Guard, and in the Ready Reserve.

Military Group Life Insurance provides a graded amount of coverage, with a top amount of $20,000 depending on age and flying status. The death benefit is *increased by 50%* if death is caused by any kind of accident, including an aviation accident.

Policyholders may also keep their insurance in force at the low group rate after they leave the service, and until age 65 — provided their coverage has been in effect for at least a 12-month period prior to date of separation.

Net cost of insurance is reduced by dividend payments, consistent with safety for all policyholders. Dividends amounting to 25% of the annual premium were paid to 1963 policyholders.

Other benefits of AFA Military Group Life Insurance include guaranteed conversion privilege, waiver of premium for disability, choice of settlement options, and a choice of convenient payment plans, including payment by allotment for those on active duty.

• MILITARY GROUP LIFE INSURANCE
ACCIDENT INSURANCE

PROGRAMS FOR AFA MEMBERS

COMPREHENSIVE ACCIDENT INSURANCE

This unique accident policy, available to *all* AFA members, offers worldwide full-time protection against all accidents except those involving crew members in aircraft accidents.

It is available in units of $5,000, to a maximum of $50,000, and may be purchased for individual protection, or for complete family protection under the popular Family Plan—both at remarkably low rates.

The Family Plan provides insurance for each member of the family under one convenient policy. The wife of the policyholder is insured for 50% of his coverage. Each child, regardless of the number of children in the family, is insured for 10% of the AFA member's coverage.

Insurance is also provided for nonreimbursed medical expenses of over $50, up to a maximum of $500. Under the Family Plan, *every* family member receives this valuable extra coverage.

In addition, policyholders receive an automatic 5% increase in the face value of their policies *each year* for the first five years their insurance is in force. There is no extra premium cost for this increase.

FLIGHT PAY INSURANCE

AFA *guaranteed* Flight Pay Protection is available to rated personnel on active duty. Protection is guaranteed even against preexisting illnesses after a policy has been in force for twelve consecutive months. This insurance protects active-duty members on flying status against loss of their flight-pay income because of injury or illness.

Grounded policyholders receive payments equal to 80% of their flight pay (tax free) for periods up to two years if grounding is caused by aviation accident, and for periods up to one year for groundings caused by illness. Because they are tax free, these payments are essentially the equivalent of full government flight pay, which is taxable income.

This plan assures members of no loss of income if they are returned to flying status within the benefit period. If grounding is permanent, they have sufficient time to adjust to a lower-income level.

FOR COMPLETE INFORMATION ON ANY OR ALL OF THESE AFA INSURANCE PLANS, RETURN THIS COUPON.

AIR FORCE ASSOCIATION
Insurance Division

1750 Pennsylvania Ave., N. W.
Washington, D. C. 20006

Gentlemen:

Without obligation please send me complete information about the AFA Insurance Program(s) checked at right.

Name_____

Rank or Title_____

Address_____

_____

City_____

State_____ Zip Code_____

- ☐ Military Group Life Insurance
- ☐ Civilian Group Life Insurance
- ☐ All-Accident Insurance
- ☐ Flight Pay Insurance

3-65

This Is AFA

The Air Force Association is an independent, nonprofit airpower organization with no personal, political, or commercial axes to grind; established January 26, 1946; incorporated February 4, 1946.

Objectives

• To assist in obtaining and maintaining adequate airpower for national security and world peace • To keep AFA members and the public abreast of developments in the field of aviation. • To preserve and foster the spirit of fellowship among former and present personnel of the United States Air Force.

Membership

Active Members: US citizens who support the aims and objectives of the Air Force Association, and who are not on active duty with any branch of the United States armed forces—$6 per year.
Service Members (non-voting, non-officeholding): US citizens on extended active duty with any branch of the United States armed forces—$6 per year.
Cadet Members (non-voting, non-officeholding): US citizens enrolled as Air Force ROTC Cadets, Civil Air Patrol Cadets, or Cadets of the United States Air Force Academy—$3 per year.
Associate Members (non-voting, non-officeholding): Non-US citizens who support the aims and objectives of the Air Force Association and who are individually approved for membership by AFA's Board of Directors—$6 per year.

Officers and Directors

JESS LARSON, President, Washington, D. C.; **GEORGE D. HARDY**, Secretary, College Heights Estates, Md.; **PAUL S. ZUCKERMAN**, Treasurer, New York, N. Y.; **DR. W. RANDOLPH LOVELACE, II**, Chairman of the Board, Albuquerque, N. M.

DIRECTORS: John R. Alison, Beverly Hills, Calif.; **Joseph E. Assaf**, Hyde Park, Mass.; **John L. Beringer, Jr.**, Pasadena, Calif.; **Robert D. Campbell**, New York, N. Y.; **Harold G. Carson**, Oaklawn, Ill.; **Edward P. Curtis**, Rochester, N. Y.; **James H. Doolittle**, Redondo Beach, Calif.; **Ken Ellington**, Lake Success, N. Y.; **Joe Foss**, New York, N. Y.; **Jack B. Gross**, Harrisburg, Pa.; **John P. Henebry**, Kenilworth, Ill.; **Joseph L. Hodges**, South Boston, Va.; **Robert S. Johnson**, Woodbury, N. Y.; **Arthur F. Kelly**, Los Angeles, Calif.; **George C. Kenney**, New York, N. Y.; **Laurence S. Kuter**, New York, N. Y.; **Thomas G. Lanphier, Jr.**, San Antonio, Tex.; **Carl J. Long**, Pittsburgh, Pa.; **Howard T. Markey**, Chicago, Ill.; **Ronald B. McDonald**, San Pedro, Calif.; **M. L. McLaughlin**, Dallas, Tex.; **J. B. Montgomery**, Westfield, N. J.; **O. Donald Olson**, Colorado Springs, Colo.; **Earle N. Parker**, Fort Worth, Tex.; **Chess F. Pizac**, Washington, D. C.; **Julian B. Rosenthal**, New York, N. Y.; **Will O. Ross**, Mobile, Ala.; **Peter J. Schenk**, Arlington, Va.; **C. R. Smith**, New York, N. Y.; **Carl A. Spaatz**, Chevy Chase, Md.; **William W. Spruance**, Wilmington, Del.; **Thos. F. Stack**, San Francisco, Calif.; **Arthur C. Storz**, Omaha, Neb.; **Harold C. Stuart**, Tulsa, Okla.; **James M. Trail**, Boise, Idaho; **Nathan F. Twining**, Washington, D. C.; **Thomas D. White**, Washington, D. C.; **Gill Robb Wilson**, Claremont, Calif.

REGIONAL VICE PRESIDENTS: William R. Berkeley, Belleville, Ill. **(Midwest)**; Anthony Bour, St. Paul, Minn. **(North Central)**; Vito Castellano, Armonk, N. Y. **(Northeast)**; N. W. deBerardinis, Shreveport, La. **(South Central)**; A. Paul Fonda, Washington, D. C. **(Central East)**; Dale J. Hendry, Boise, Idaho **(Northwest)**; Joseph C. Jacobs, Bountiful, Utah **(Rocky Mountain)**; Glenn D. Mishler, Akron, Ohio **(Great Lakes)**; Edward I. Nedder, Hyde Park, Mass. **(New England)**; Martin M. Ostrow. Los Angeles, Calif. **(Far West)**; A. P. Phillips, Jr., Orlando, Fla. **(Southeast)**; Joe Shosid, Fort Worth, Tex. **(Southwest)**.

Community Leaders

ALABAMA: Glenn Messer, 6 N. 55th Pl., **Birmingham**; E. J. Packowski, P. O. Box 1692, **Brookley AFB**; Seth Mize, 115 Robin Lane, **Huntsville**; Bobby J. Ward, CMR Box 5233, **Maxwell AFB**; D. A. Nutter, P. O. Box 2584, **Montgomery**; Robert J. Martin, P. O. Box 686, **Selma**.

ALASKA: Neil Harper, Box 84, **Anchorage**; Lester Bronson, P. O. Box 520, **Nome**.

ARIZONA: Robert Landry, 3540 W. Osborn Rd., **Phoenix**; Hugh Stewart, 709 Valley National Bldg., **Tucson**.

ARKANSAS: Ewing Kinkead, 1718 Magnolia Ave., **Little Rock**.

CALIFORNIA: Myron Aitkin, 791 Sierra View Way, **Chico**; C. A. Delaney, 1808-A Newport Blvd., **Costa Mesa**; Peter Reed, Fleetwood Annex, **Covina**; Daniel A. McGovern, P. O. Box 277, **Edwards AFB**; C. W. Sidders, 1393 Helix View, **El Cajon (San Diego Area)**; Paul Laufenberg, 533 Union Ave., **Fairfield**; Sam Boghosian, 6012 N. Roosevelt, **Fresno**; Jack Sheldon, 3845 Stevely Ave., **Long Beach**; Robert Szabo, 5421 Deane Ave., **Los Angeles**; Stanley J. Hryn, 10 Shady Lane, **Monterey**; Thomas G. Burford, 1378 Joyce S., **Novato**; Melvin Engstrom, P. O. Box 93, **Riverside**; Robert R. Switzer, 5320 Gilgum Way, **Sacramento**; Blake L. Johnson, 465 E. Wabash, **San Bernardino**; Robert O. Fouts, 703 Market St., **San Francisco**; James M. Ford, 1125 25th St., **San Pedro**; Ellis Eno, P. O. Box 1111, **Santa Monica**; Marie F. Henry, P. O. Box 108, **Tahoe City**; Doris Parlaman, 3115 W. 181st St., **Torrance**; James L. Curnutt, P. O. Box 1582, **Vandenberg AFB**; Glenn J. Dusen, 146th Transport Wing, 8030 Balboa Blvd., **Van Nuys**; Myron Smith, 4373 Westmont St., **Ventura**; Albert Swift, 6407 Oakdale Ave., **Woodland Hills**.

COLORADO: Dietz Lusk, Jr., 121 E. Vermijo, **Colorado Springs**; Barry C. Trader, 1373 Spruce St., **Denver**; H. Paul Canonica, 820 Beulah Ave., **Pueblo**.

CONNECTICUT: Joseph C. Horne, Yankee Pedlar Inn, **Torrington**.

DELAWARE: Chesley Smith, 1903 Floral Dr., **Wilmington**.

DISTRICT OF COLUMBIA: Lucas V. Beau, 2610 Upton St., N.W.

FLORIDA: C. S. Nelson, P. O. Box 1395, **Bartow**; Hobart Yeager, P. O. Box 852, **Miami**; H. A. Hauck, P. O. Box 4717, **Patrick AFB**; Charles J. Tanner, Jr., 7421 Olin Way, **Orlando**; J. D. Briggs, 4904 San Nicholas, **Tampa**.

GEORGIA: Charles Ford, Jr., 3105 Ivan Hill Dr., S.W., **Atlanta**; J. S. Pierce, Jr., P. O. Drawer 858, **Warner Robins AFB**.

HAWAII: John King, 1441 Kapiolani Blvd., **Honolulu**.

IDAHO: Marcus B. Hitchcock, Jr., P. O. Box 1098, **Boise**; C. R. Lynch, P. O. Box 216, **Burley**; Darrell Manning, 1633 E. Elm, **Pocatello**; L. James Koutnik, P. O. Box 365, **Twin Falls**.

ILLINOIS: Edith F. Duplex, 1219 W. Grace St., **Chicago (N. Chicago)**; Leonard Luka, 3450 W. 102d St., **Evergreen Park (S. Chicago)**; Ludwig H. Fahrenwald, 108 N. Ardmore Ave., **Villa Park (W. Chicago)**; Harold G. Carson, 9541 S. Lawton St., **Oak Lawn (S. W. Chicago)**; Earl Palmberg, 903 W. Main, **Urbana**.

INDIANA: George L. Hufford, Box 6G, RR No. 1, **Greenwood**.

IOWA: Leignton Misbach, 614 S. Minn. St., **Algona**; Darlowe L. Oleson, 609 35th St., S.E., **Cedar Rapids**; Ric Jorgenson, 710 Insurance Bldg., **Des Moines**.

KANSAS: D. C. Ross, 10 Lynchwood, **Wichita**.

KENTUCKY: Ronald M. Peters, Box 432, Route 4, **Anchorage**.

LOUISIANA: Michael M. Bearden, P. O. Box 305, **Alexandria**; Edward J. Stone, 865 Magnolia Woods Dr., **Baton Rouge**; E. L. Bottom, 941 Elmeer Ave., **Metairie**; J. W. Parkerson, 1902 Myrtle St., **Monroe**; Michael Kirk, 1024 Burgundy St., **New Orleans**; H. J. McGaffigan, 265 Stuart St., **Shreveport**; Donald Miller, 1521 Slattery Bldg., **Shreveport (Bossier-Barksdale Area)**.

MASSACHUSETTS: Hugh P. Simms, 122 Commonwealth Ave., **Boston**; Andrew Trushaw, 204 N. Maple, **Florence**; Tommy Meyers, P. O. Box 195, **Lexington**; E. E. Myllimaki, 30 Scannell Rd., **Randolph**; Michael A. Sicuranze, 30 Wamesit Ave., **Saugus**; William H. Anger, 38 Robert St., **Taunton**; Edwin Thomson, RFD 1, Montgomery Rd., **Westfield**; James C. Lapery, 3 Nottingham Rd., **Worcester**.

MICHIGAN: Rudolph Bartholomew, 52 N. 22d St., **Battle Creek**; Alfred J. Lewis, Jr., 4292 Kenmore Rd., **Berkley**; Robert Saltsman, 208 Larchlea, **Birmingham**; Dewey Lenger, Jr., 710 Mulford Dr., S. E., **Grand Rapids**; Case W. Ford, 10810 Hart, **Huntington Woods**; Robert E. Gunnett, 213 W. Vine, **Kalamazoo**; Dennis F. Haley, 715 W. Lenawee St., **Lansing**; Rennie Mitchell, 36 Miller, **Mt. Clemens**; Jerome Green, 23090 Parklawn, **Oak Ridge**; Norman L. Scott, 412 W. LaSalle, **Royal Oak**.

MINNESOTA: W. K. Wennberg, 4 Carlson, **Duluth**; Dick Palen, 4440 Garrison Lane, **Edina**; J. F. Kocourek, 1200 Beam, **St. Paul**.

MISSOURI: Allen Adams, 3910 Homestead Rd., **Prairie Village (Kansas)**; Charles Coleman, 7205 N. Roland Dr., **St. Louis**.

NEBRASKA: Richard Andrews, 719 E. 6th St., **Hastings**; Frank E. Sorenson, 103 Teachers College, University of Nebraska, **Lincoln**; L. H. Grimm, 5103 Hamilton, **Omaha**.

NEVADA: Barney Rawlings, 2617 Mason Ave., **Las Vegas**.

NEW HAMPSHIRE: Robert H. Curran, **Grenier Field**.

NEW JERSEY: K. F. Laino, 177th Materiel Sqdn., NJANG, NAFEC, **Atlantic City**; Amos L. Chalif, 140 Main St. **Chatham**; Joseph Bendetto, 2164 Hudson Blvd., **Jersey City**; Salvatore Capriglione, 83 Vesey St., **Newark**; John F. Russo, 471 3d St., **Palisades Park**; Nathan Lane, 76 E. 35th St., **Paterson**; Daniel B. McElwain, 31 Washington Rd., **Princeton Junction**; Richard W. Spencer, 290 Winding Lane, **Riverton**; Matthew Walters, Amory Dr., **Trenton**.

NEW MEXICO: John J. Wilkinson, 1011 New York Ave., **Alamogordo**; James Harvey, P. O. Box 8961, **Albuquerque**; Loyd Franklin, P. O. Box 191, **Clovis**; Kermit Shotts, 1110 S. Main St., **Roswell**.

NEW YORK: Earle Ribero, 257 Delaware Ave., **Delmar (Albany Area)**; James Wright, 13 Devon Lane, **Williamsville (Buffalo Area)**; Willard Dougherty, 7 Rockledge Rd., **Hartsdale (Long Island Area)**; H. R. Carlson, Hunt & Winch Rd., **Lakewood**; Stuart Nachamie, 2756 Covered Bridge Rd., **Merrick**; G. J. Roberts, 382 Grove St., **Patchogue**; C. A. Lewis, 53 Court St., **Plattsburgh**; Nicholas Mammone, 900 Valentine Ave., **Rome (Syracuse Area)**; W. B. Corts, Box 92, **Vails Gate**.

OHIO: Herb Bryant, 2307 24th St., NE, **Canton**; Ralph Overman, 29 Ferndale Ave., **Cincinnati**; Ray Saks, 2823 Sulgrave, **Cleveland**; Francis D. Spaulding, 718 Martha Lane, **Columbus**; Milton Kult, 1006 Sackett Ave., **Cuyahoga Falls**; A. J. Cannon, 245 Omalee Dr., **Xenia (Dayton Area)**.

OKLAHOMA: David L. Field, 306 W. Broadway, **Enid**; Arthur de la Garza, P. O. Box 1924, **Oklahoma City**; Roy Cartwright, Guaranty Nat'l Bank, **Tulsa**.

OREGON: Ernest A. Heinrich, Route 2, Box 755, **Oregon City**; Clyde Hilley, 2141 N. E. 23d Ave., **Portland**.

PENNSYLVANIA: Herbert Frye, Pilot's Club, ABE Airport, **Allentown**; James Simon, 721 18th St., **Ambridge**; George Crosby, P. O. Box 1001, **Erie**; Leroy Krebs, 225 Park Ave., **Glenn Rock**; L. E. Snyder, P. O. Box 2226, **Harrisburg**; A. G. Sterrett, P. O. Box 221, **Lewistown**; Rev. William Laird, P. O. Box 7705, **Philadelphia**; John G. Brosky, 712 City County Bldg., **Pittsburgh**; Francis E. Nowicki, 280 County Line Rd., **Wayne**.

RHODE ISLAND: William Dube, 82 S. Atlantic Ave., **Warwick**.

SOUTH CAROLINA: Kenneth Burdette, P. O. Box 228, **Charleston**.

SOUTH DAKOTA: John H. Maxwell, 309 7th St., **Brookings**; Elmer M. Olson, **Piedmont**; John Davies, 1222 S. Willow Ave., **Sioux Falls**.

TENNESSEE: W. L. Cramer, 1283 Marcia Rd., **Memphis**; Peter Trenchi, Jr., P. O. Box 2015, **Tullahoma**.

TEXAS: Bill Senter, P. O. Box 3233, **Abilene**; Robert Mills, P. O. Box 1931, **Amarillo**; Bob Langford, 1110 W. Ave., **Austin**; Herbert Hicks, 450 Poenisch, **Corpus Christi**; Lester Morton, **Big Spring**; W. J. Hesse, LTV Aeronautics Div., P. O. Box 5907, **Dallas**; Herbert Roth, 4261 Canterberry, **El Paso**; Hubert Foster, 400 Trans-Amer. Life Insurance Bldg., **Fort Worth**; John Klepp, P. O. Box 52122, **Houston**; Bob Nash, KFYO, 914 Ave. J, **Lubbock**; Russell Willis, P. O. Box 712, **San Angelo**; Joe Draper, 1208 Tower Life Bldg., **San Antonio**; Anthony Feith, P. O. Box 472, **Sherman**; Fred Smith, P. O. Box 4068, Bellmead Station, **Waco**; Harold Shappell, 1700 Grant, **Wichita Falls**.

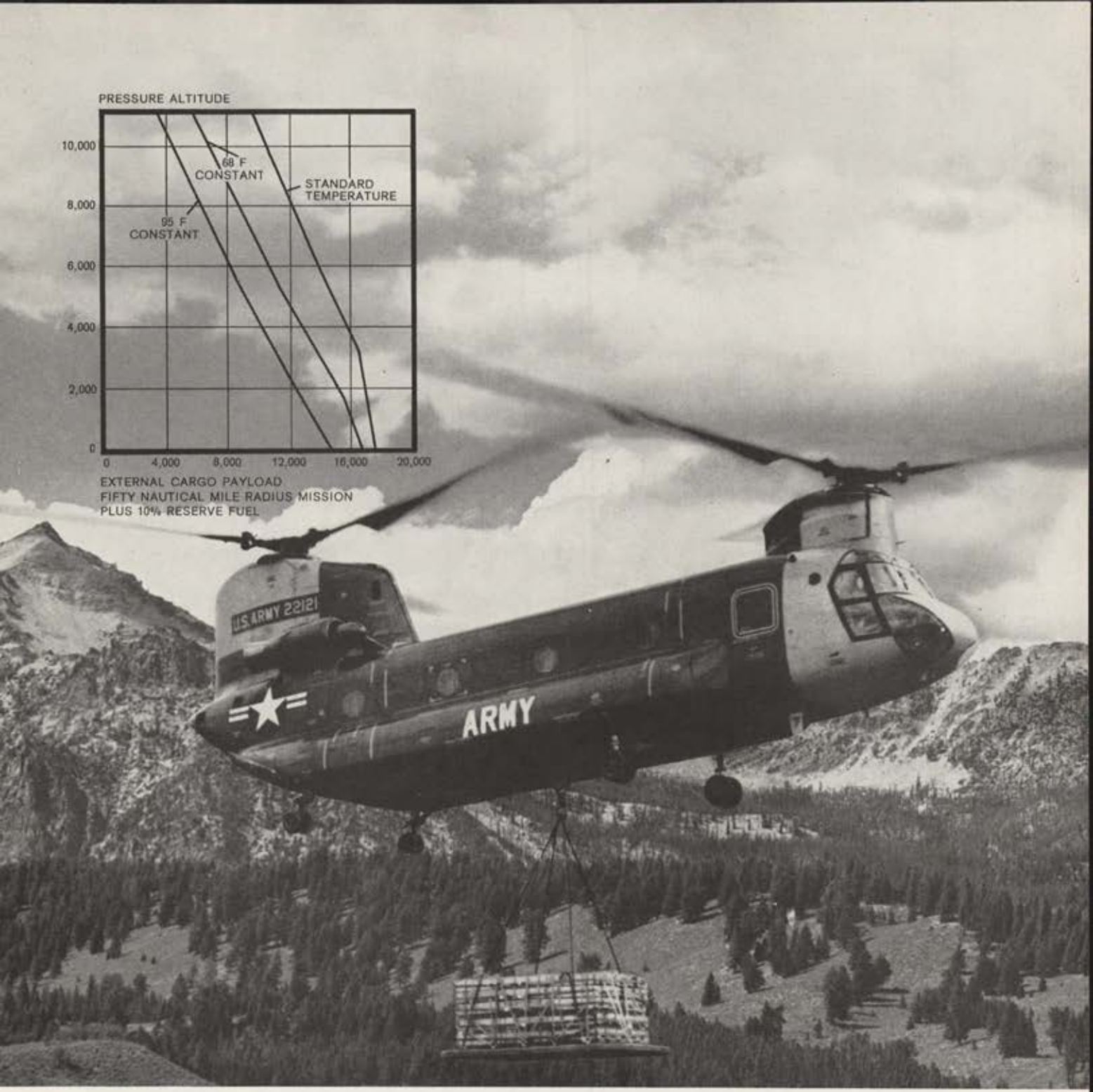
UTAH: Malcolm Birth, 74 S. 10th E., **Bountiful**; Edward Przybys, P. O. Box 28, **Brigham City**; David Whitesides, P. O. Box 142. **Clearfield**; Henry Dee, P. O. Box 606, **Ogden**; C. Leon Jorgensen, 2117 W. 6050 South, **Roy**; Leigh Hunt, 1107 S. 19th E., **Salt Lake City**; M. G. Groesbeck, 171 W. 2d St., **Springville**.

VERMONT: Herbert Stewart, P. O. Box 164, **Burlington**.

VIRGINIA: T. W. Stephenson, 5363 Taney Ave., #300, **Alexandria**; John A. Pope, 4610 N. 22d St., **Arlington**; Ray E. Ricketts, P. O. Box 654, **Danville**; W. L. Coffey, 2121 Edinboro Ave., **Lynchburg**; Virginia Biggins, P. O. Box 1631, Warwick Station, **Newport News**; Brodie Williams, Jr., P. O. Box 96775, **Norfolk**; Thomas Leivesley, 3258 Bromley Rd., **Roanoke**; F. A. Ergenbright, 512 E. Beverley Dr., **Staunton**.

WASHINGTON: Roy Lewis, S. 2402 Park Dr., **Spokane**; James March, Box 3351, **Tacoma**.

WISCONSIN: Leonard Dereszynski, 300 E. College Ave., **Milwaukee**.



Take to the hills...and hover

High terrain may be the optimum for line-of-sight communications links, but it poses tough transportation for men and equipment.

And here's where the CH-47A Chinook will prove itself invaluable for the USAF's Tactical Air Control System, key to joint Air Force & Army coordinated operations. This versatile helicopter, with its remarkable hover capability, can externally lift radar and communication systems, supplies and ancillary equipment with the systems personnel in the cabin. Other missions in the Tactical Air Control System such as the deployment of vehicles, equipment and personnel of the Forward Air Control Parties can be totally carried internally. All can be accomplished in a minimum of time and with a minimum of landing site preparation.

Part of this is due to the tandem-rotor configuration which develops high lift and exceptional balance and stability. It gives the Chinook the ability to hover out of ground effect at a 6,000 foot altitude in temperatures of 95 F; lift an external load of 8,200 pounds; take it on a 50 nautical mile mission and return to base. On missions to low-lying savannahs it can perform even better, carrying up to 17,850 pounds external payload for the same 50 nautical mile range.

The CH-47A Chinook is in volume production and as a result of extensive field operations and testing was designated by the Dept. of Defense as "Standard" equipment. It is the product of creative engineering and forward-thinking weapons system management of the Boeing Company.

BOEING
VERTOL DIVISION
MORTON, PENNSYLVANIA

The PHANTOM II, utilizing in-flight refueling, can fly non-stop from the mainland of the United States to the scene of every Limited Action that has occurred since 1945 in less than 14 hours.

Phantom Flight-Times to Scenes of Limited Actions

1. West New Guinea ..... 11 hours
2. Goa ..... 13½ hours
3. Dominican Republic ..... 40 minutes
4. Berlin ..... 5½ hours
5. Laos ..... 13 hours
6. Congo ..... 10 hours
7. Cuba ..... 5 minutes
8. Tibet ..... 12½ hours
9. Quemoy ..... 11 hours
10. Iraq ..... 9½ hours
11. Lebanon ..... 8 hours
12. Greece ..... 7 hours
13. Chinese Invasion of India ... 12½ hours
14. Indonesian Revolt ..... 13½ hours
15. Muscat-Oman ..... 11 hours
16. Hungary ..... 7 hours
17. Suez ..... 9 hours
18. Tachens ..... 11 hours
19. Guatemala ..... 35 minutes
20. Algeria ..... 5 hours
21. Korea ..... 9 hours
22. Chinese Reds take over China 10 hours
23. Israel Blockade ..... 9 hours
24. Viet Nam ..... 13 hours

This global capability was demonstrated in an 18-hour, 10,000-mile non-stop flight of four Tactical Air Command Phantoms from MacDill AFB, Fla., December 1-2, 1964.

Fully loaded Phantoms operate easily from hard surface 5,000-foot runways, even with bombloads of more than 7 tons. Hundreds of serviceable asphalt runways, already built, can now be used for combat operations of the Phantom now entering service with the United States Air Force. Few other jet fighters can now even operate from short runways like these. None can match the Phantom's capability for bringing Mach 2 multiple-mission, all-weather, heavy load carrying air power to advanced fighter strips.

Fully loaded Navy and Marine Phantoms also operate from aircraft carriers.

MCDONNELL

Phantom II Fighter, Attack and Reconnaissance Aircraft • STOL Transport •
Gemini, Asset and Aeroballistic Spacecraft • Capsular Escape Systems • Talos Missile Airframes and Engines •
Electronic Systems and Equipment • Photo Instrumentation Equipment and Systems • Automation

ST. LOUIS